Bede
On the Nature of Things *and* On Times

Translated with introduction, notes and commentary by Calvin B. Kendall and Faith Wallis



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Volume 56

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CALVIN B. KENDALL
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To our best beloveds,
Eleanor Kendall and Kendall Wallis,
who teach us what is most important
about the nature of things,
and who share all our times.



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At the conclusion of a long and happy collaboration, it is our special pleasure and privilege to acknowledge our debt to Dr Mary Whitby, who had the wit to bring us together in the first place, and then to keep us on track with counsel and encouragement until the moment when the project came into its final fruition. Collaboration can take different forms and mean different things. It may not be out of place to describe ours. Each of us had, independently and without knowing of the other's efforts, drafted translations of Bede's *De natura rerum* and *De temporibus* and begun the work of annotation and commentary, when Mary, learning of these parallel projects, put us in touch and proposed collaboration. Then began an intense period of joint scholarly effort, extending over several years during which we exchanged hundreds of e-mails and met from time to time for 'summit conferences', as we liked to think of them, at Kalamazoo, Michigan, in the Green Mountains of Vermont and in the lovely city of Montreal. Our method was simple: we stitched together our preliminary versions into a single electronic master-file, and then exchanged the file, turn and turn about, over and over again, accepting or rejecting each other's work, word by word, line by line, all the while adding new materials, until we reached complete agreement. As we look back at it, it has proved to be a seamless collaboration, and we are jointly responsible for the whole, both for whatever value it may possess and, of course, for errors of fact and judgement that remain. We are grateful to Prof George H. Brown and Dr Joshua Westgard for sharing unpublished materials and making factual corrections to our inventory of manuscripts. Prof Michael Lapidge reviewed the entire manuscript with meticulous care, suggesting changes, saving us from numerous blunders and calling our attention to unjustly neglected resources. We wish also to acknowledge the generous assistance of Dr Kate Harris, Curator, Longleat Historical Collections, in providing information on the Longleat manuscript of Bede's *De natura rerum*. Alison Welsby, the TTH series commissioning editor, deftly handled a delicate problem that threatened to delay publication. Our greatest debt is to our spouses, who have cheerfully tolerated our Bedan obsessions

over many years, and who surrounded us with warmth and enlivened our evenings with good fellowship in the course of our various 'summit conferences'.

ABBREVIATIONS

Ambrose, *Hex.*	Ambrose, *Hexaemeron*
ANF	The Ante-Nicene Fathers
ASE	Anglo-Saxon England
Augustine, *DCD*	Augustine, *De ciuitate Dei*
—— *DGAL*	*De Genesi ad litteram*
Bede, *DNR*	Bede, *De natura rerum*
—— *DT*	*De temporibus*
—— *DTR*	*De temporum ratione*
—— *EH*	*Ecclesiastical History of the English People*
—— *In Gen.*	*In Genesim*
—— *ONT*	*On the Nature of Things* [= *De natura rerum*]
—— *OT*	*On Times* [= *De temporibus*]
BHW	*Bede and his World*, ed. Lapidge
Blaise	Blaise, *Dictionnaire latin-français des auteurs chrétiens*
BOH	*Venerabilis Baedae Opera Historica*, ed. Plummer
BOT	*Bedae opera de temporibus*, ed. Jones
CCSL	Corpus Christianorum series latina
Colgrave and Mynors	*Bede's Ecclesiastical History of the English People*, ed. Colgrave and Mynors
CSASE	Cambridge Studies in Anglo-Saxon England
CSEL	Corpus Scriptorum Ecclesiasticorum Latinorum
Fontaine, *Traité*	Isidore, *DNR*: *Traité de la nature*, ed. Fontaine
Gameson, *Manuscripts*	Gameson, *The Manuscripts of Early Norman England*
Gneuss, *Handlist*	Gneuss, *Handlist of Anglo-Saxon Manuscripts*
HMML	Hill Museum and Manuscript Library, manuscript database
Isidore, *DNR*	Isidore, *De natura rerum*
—— *Etym.*	*Etymologiae*
Ps.-Isidore, *DOC*	Pseudo-Isidore, *Liber de ordine creaturarum*
Jerome, *Chron.*	Jerome, *Chronicon*
Jones, 'MSS of Bede's *DNR*'	Jones, 'Manuscripts of Bede's *De Natura Rerum*'
—— *BP*	*Bedae Pseudepigrapha*

Jordanus	*Jordanus: An International Catalogue of Mediaeval Scientific Manuscripts*
Josephus, *Ant.*	Josephus, *Historiae antiquitatis iudaicae*
Krusch, 1	Krusch, *Studien zur christlich-mittelalterlichen Chronologie: Der 84-jährige Ostercyclus*
Krusch, 2	Krusch, *Studien zur christlich-mittelalterlichen Chronologie: Die Entstehung unserer heutigen Zeitrechnung*
LCL	Loeb Classical Library
MGH	Monumenta Germaniae Historica
MGH: AA	MGH: Auctores Antiquissimi
Mommsen, *CM* 3	Mommsen, *Chronica minora* 3 (MGH: AA 13), 223–354
Niermeyer	Niermeyer, *Mediae latinitatis lexicon minus*
OLD	*Oxford Latin Dictionary*
PL	Patrologiae cursus completus, series latina
Pliny, *NH*	Pliny, *Naturalis historia*
Rep. Chron.	*Repertorium Chronicarum*
Souter	Souter, *A Glossary of Later Latin to 600 AD*
Stevens, App. 1	Stevens, 'Bede's Scientific Achievement', Appendix I
TTH	Translated Texts for Historians

INTRODUCTION

The Venerable Bede (672/3–735), a monk in the Anglo-Saxon monastery of Wearmouth-Jarrow in Northumbria, was the most remarkable scholar and intellect of his age in Western Europe. He is best remembered today for his crowning achievement, *The Ecclesiastical History of the English People*, a work of great literary power to which we owe nearly everything we know about the Anglo-Saxon invasion and settlement of England, the conversion of the Anglo-Saxons to Christianity, and the intertwined development of political, religious, and educational institutions in the country up to his own day. But the range of his writings was enormous, extending from learned commentaries on many of the books of the Old and New Testaments to sermons and hymns and lives of the saints to textbooks on a variety of subjects for use in the classroom.[1]

DATE AND PURPOSE OF *ON THE NATURE OF THINGS* (*ONT*) AND *ON TIMES* (*OT*)

On the Nature of Things[2] and *On Times*,[3] two short and seemingly unpretentious works, are of great significance not only because they were probably Bede's first literary productions, but because they set up certain landmarks for his future development as a thinker and writer. *On the Nature of Things* is an inventory of the material universe based on a venerable classical model; *On Times*, by contrast, represents the new Christian genre of the *computus* manual – a genre which Bede himself played a very significant role in developing. Both types of writing have important moral dimensions. Ancient cosmology and natural history from the Pre-Socratics through to Lucretius (whose great poem furnished the title for Isidore of Seville's treatise, and

1 For an illuminating summation, see Brown, *A Companion to Bede*, esp. ch. 1: 'Bede's Life and Times', pp. 1–16.

2 *De natura rerum* (*DNR*), ed. Jones, CCSL 123A, 173–234.

3 *De temporibus* (*DT*), ed. Jones, *BOT*, pp. 293–303; CCSL 123C, 579–611.

thence for Bede's[4]) had an ethical purpose: to refute superstition by setting forth rational explanations of the nature of the universe in general, and its more awe-inspiring spectacles in particular (eclipses, earthquakes, thunder and lightning). A second related purpose was to foster pious admiration for the beauty and order of the world. For the ancients, the world itself was divine and eternal. For Isidore of Seville, whose *De natura rerum* was the first sustained Christian non-exegetical treatment of cosmology in Latin, the focus of piety was the Creator, not creation. Nonetheless, he shared Lucretius's aim of demystifying natural phenomena through reason. Isidore wrote *De natura rerum* in the aftermath of the striking lunar and solar eclipses of 611–612, and there is abundant evidence that the work was intended to respond not only to 'popular superstition', but to Christian apocalyptic speculation.[5] Bede composed *On the Nature of Things*, his revised version of Isidore's cosmology, at approximately the same time as he was working on his own commentary on the Apocalypse; moreover, the companion treatise *On Times*, as well as being a pious reflection on the divinely instituted order of time, promoted a radically revised chronology of world-history apparently targeted against apocalyptic speculation.

On the Nature of Things is also a work that could have easily been adapted for teaching. The same is the case for *On Times*, where the definitions and formulas can readily be turned into questions, such as 'What is a day?' (ch. 2), 'What is the difference between a lunar month and a solar month?' (ch. 5), 'How do you find the solar concurrent for the present year?' (ch. 14). Bede would certainly have been familiar with didactic question-and-answer dialogues for teaching *computus*, as they were found in both Irish and continental milieux. By taking a straightforward expository approach, however, Bede allowed *On Times* to be used in other contexts, for example as 'talking points' in discussions arising from the Insular Easter controversy. Ceolfrith's letter to Necthan, king of the Picts, explaining the Alexandrian *computus* (*EH* 5.21) may have been accompanied by *On Times.*

Bede 'published' *On the Nature of Things* and *On Times* at about the time that he was ordained as a priest at the age of thirty. The exact year of the composition of *On the Nature of Things* is unknown, but it is intimately connected with *On Times*, which appeared in AD 703, and there is every reason to believe that the two works were written in conjunction with each other.[6] It

4 On Bede's scanty knowledge of Lucretius, see Appendix 4.

5 Fontaine, *Traité*, Introduction, pp. 3–6.

6 For an argument against the inference that *On the Nature of Things* was significantly earlier than *On Times*, see Appendix 3.

is certain that *On Times* was completed in 703 because in the last dated entry of the world-chronicle with which *On Times* ends Bede states: 'At this time Tiberius is in the fifth year [of his rule] in the first indiction'. Tiberius was Tiberius III Apsimar, who ruled the Eastern Roman Empire from 698—705. We may surmise that Bede had been collecting and organizing his materials during the previous decade as he sought for the most effective ways to teach his students the elements of God's plan as revealed in the natural world and how they could be used to calculate the proper time to celebrate Easter.[7]

STRUCTURE AND CONTENT OF *ONT* AND *OT*

It would be natural for Bede to conceive of paired works on cosmology and chronology, because the beginning of time was part of the story of creation as narrated in the first and second chapters of Genesis (1:1-2:3). Not surprisingly, Bede grounded his cosmology in the Genesis account. In later years, he wrote a 'hexaemeron', an encyclopaedic exegesis on the six days of God's creation of the world, which was eventually incorporated into book 1 of his commentary *On Genesis*.[8] This hexaemeron makes explicit the theological underpinning of *On the Nature of Things* and *On Times*. The three works are thus asymmetrical but complementary. The theological account in *On Genesis* is evidently more significant from Bede's perspective, but he deals in it with physical issues as well. The difference between them is one of genre (which determines organization, tone, and selection of material) and intention. In *On the Nature of Things,* starting with creation and the universe as a whole, Bede reads the cosmos downwards from the heavens, through the atmosphere, to the oceans and rivers of earth. He takes up the four basic elements – earth, air, fire, and water, the heavenly bodies and their orbits, meteorological phenomena like thunder and lightning, rainbows, hail and snow, apparent disruptions of the natural order like eclipses, earthquakes and volcanoes, and plagues, and the fact that the earth is a globe, and its zones and climates (see Figure 1, p. 134).

Fascinated as he was by the underlying order and regularity of physical phenomena, Bede's deepest interest was undoubtedly in the temporal order of nature, because natural time plays an essential role in the correct

7 For possible connections between Bede's ordination as deacon at the age of nineteen and priest at the age of thirty and his career as teacher and writer, see Kendall, 'Bede and Education', p. 105.

8 *On Genesis* 1.1:1–1.2:3a/b, trans. Kendall, pp. 68–105.

celebration of Easter. For this reason, he may have thought of *On the Nature of Things* as an extended prolegomenon to *On Times. On Times*, like its ‘second, revised and enlarged edition’, *The Reckoning of Time* (*De temporum ratione*),[9] works upwards from the smallest units of time, through the day and night, the week, month and year, to the world-ages. Crucially, Bede takes advantage of these units, the definitions of which were a staple of the encyclopaedic compendia of Late Antiquity, to introduce step-by-step the data, including mathematical formulas, that a student would need to understand the construction of an Easter-table. In so doing he transformed his sources.

UNITY OF CONCEPTION OF *ONT* AND *OT*

Conceived though they were, so far as we can judge, as companion volumes, *On the Nature of Things* and *On Times* almost immediately drifted apart in the manuscript transmission. The drift began in the Carolingian period, particularly on the continent, when *On Times* was replaced by *The Reckoning of Time*, and *On the Nature of Things* began an independent career with the cosmographical tradition. Of the 42 ninth-century manuscripts on our list which contain either *On the Nature of Things* or *On Times* or both (excluding extracts and copies containing only the chronicle from *On Times*) 22 contain *On the Nature of Things* together with *On Times*, 15 contain *On the Nature of Things* without *On Times* (in eight cases, *On the Nature of Things* is paired with *The Reckoning of Time*), and five contain *On Times* without *On the Nature of Things*. In other words, by the Carolingian period almost half of the manuscripts containing either text contained only one of the pair. In the modern era, Charles W. Jones edited *On Times* but not *On the Nature of Things* in his magisterial volume *Bedae Opera de Temporibus*.[10] He later published the two independently in separate volumes of the *Corpus Christianorum* (123A and 123C).

9 *De temporum ratione* (*DTR*), ed. Jones, *BOT*, pp. 173–291; CCSL 123B, 263–544; trans. Wallis, *The Reckoning of Time*, pp. 3–249.

10 Of the decision to omit *On the Nature of Things*, he remarked, ‘to my mind, that survey of natural science should be published together with Bede’s commentary on Genesis’ (*BOT*, p. viii). *BOT* contains Jones’s definitive edition of *The Reckoning of Time* as well as *On Times*. But from both of these works he omitted the world chronicles with which they conclude with the observation that he could not improve upon Theodor Mommsen’s ‘sound editions’ in the *Monumenta Germaniae Historica* (*BOT*, p. viii). The exigencies of book production in the midst of the Second World War no doubt influenced that unfortunate decision, which he rectified in his republications of *The Reckoning of Time* and *On Times* in the *Corpus Christianorum*.

Bede, however, always spoke of *On the Nature of Things* and *On Times* together. In the Preface to *The Reckoning of Time*, he says, ‘Some time ago I wrote two short books in a summary style which were, I judged, necessary for my students; these concerned the nature of things, and the reckoning of times’.[11] In the bibliography he appended to his *Ecclesiastical History*, he expresses himself similarly: ‘Two books, one on the nature of things and the other on chronology; also a longer book on chronology’.[12] And indeed the verse epigraph that he prefixed to *On the Nature of Things* unmistakably applies to both books. Bede’s order is overwhelmingly the order followed by scribes in later centuries when the two works were copied in the same manuscript. *On Times* follows *On the Nature of Things* sequentially, without a break, in 56 of the surviving manuscripts. In several manuscripts from the ninth century onwards (e.g., St Gall 248, our *DNR*, no. 100/*DT*, no. 77) the two works are treated as a single treatise in two books, with *On Times* designated as ‘book 2’. The reverse order, with *On Times* preceding *On the Nature of Things* is found only three times.[13]

Of course, the two works are distinct. They represent a deliberate splitting of Isidore’s *DNR*, and Bede gave them separate titles and lists of chapters. As with his grammatical textbooks *The Art of Poetry* (*De arte metrica*) and *The Figures of Rhetoric* (*De schematibus et tropis*), which he likewise spoke of in the same breath, he observed a hierarchy of domains according to which related but logically independent subjects were dealt with separately, but kept in close association. This probably mirrors Bede’s pragmatic and vocational approach to teaching. The curriculum was dictated, not by the abstract schema of the ‘seven liberal arts’, but by the need of his pupils for instruction in the particular topics for which Bede prepared his manuals. The present volume brings the two companion texts on nature and time together again in accordance with what we conceive to have been Bede’s original intention.[14]

11 *The Reckoning of Time*, Preface, trans. Wallis, p. 3.

12 *EH* 5.24: Colgrave and Mynors, p. 571.

13 In Rouen, Bibliothèque municipale U74, a twelfth-century manuscript from Jumièges (our *DT*, no. 76/*DNR*, no. 99), Valenciennes, Bibliothèque municipale 343, a tenth-century manuscript from St Amand (our *DT*, no. 91/*DNR*, no. 116), and possibly in Zürich, Zentralbibliothek Car C 176, a manuscript of the tenth or eleventh century (our *DT*, no. 111/*DNR*, no. 142). Bern, Burgerbibliothek 610, and Cambridge University Library Gg II 21, are not counted here because *DT* is either incomplete or excerpted.

14 In addition to the MSS that designate them as books 1 and 2 of a single work, there are some Carolingian MSS that actually fuse the two works into a single text, e.g. Bern 610 (our *DNR*, no. 12/*DT*, no. 9) and Paris, B.N. lat. 13013 (our *DNR*, no. 90/*DT*, no. 67).

THE PLACE OF *ONT* AND *OT* IN BEDE'S THOUGHT

To understand how *On the Nature of Things* and *On Times* fit into the larger trajectory of Bede's development as a thinker and writer, we need to know what kind of books these are, and what were the expectations aroused by this genre. *On the Nature of Things* and *On Times* are conventionally categorized by modern scholars as 'schoolbooks', 'didactic manuals' or *didascalica*, with the implication that they are simplified introductions for the instruction of presumably young and unlearned students. There is much evidence that Bede's students did indeed use these works – he says in the introduction of *The Reckoning of Time* that they clamoured for an expanded edition of both – but we need not conclude that *On the Nature of Things* and *On Times* were derivative or uncontroversial. In fact, both were quite innovative, and *On Times* in particular provoked a storm of criticism. To be sure, they are early works from Bede's pen, but so was his *Commentary on the Apocalypse* – a bold choice for a maiden voyage in Biblical exegesis. Bede was a scholar and a monk, but also seems to have been confident and self-assured about what he was doing as a writer; he was respectful of ancient authority, but also of his own powers to interpret and re-shape traditional learning.[15] The fact that he was working on his Apocalypse commentary at about the same time as he was composing *On the Nature of Things* and *On Times* is certainly not without significance. The classical *de natura rerum* genre, even when Christianized by Isidore of Seville, always had as its implicit aim the deflating of superstitious fear of natural phenomena through rational explanation. And in the chronicle which concludes *On Times*, Bede offers a vigorous challenge to a chronology of world history that encouraged belief in the imminence of the Last Judgement, or at least confidence that its date could be predicted. His *Commentary on the Apocalypse* likewise takes the position that the vision of John is an allegory of the perennial conflict of good and evil, not a straightforward timetable for the Last Days.[16]

Another point to bear in mind is the primacy of Biblical study and Christian *doctrina* for Bede. The astronomy and cosmology of *On the Nature of Things* is not knowledge acquired and enjoyed for its own sake, but *practical* knowledge. In the medieval scheme of things, 'practical' rarely means utili-

15 Roger Ray, 'Who did Bede think he was?', pp. 11–35.

16 The *Expositio Apocalypseos* has recently been edited by Roger Gryson. Faith Wallis is preparing a translation for the Translated Texts for Historian series. Gerald Bonner's 'Saint Bede in the Tradition of Western Apocalyptic Commentary' remains a useful introduction. See also Peter Darby, 'Bede's Eschatological Thought'.

tarian. It is always linked to the ancient notion of 'practical philosophy', that is, of ethics. To envisage astronomy as practical meant, then, two things for Bede: 'the uses of the regular motions of the heavens to reckon the passing of times and seasons, and the attempts to incorporate those celestial virtues of stability and order into human lives and societies'. These processes are independent of 'any formal articulation of mathematical astronomy or philosophical cosmology'.[17] Bede was following in the footsteps of the fathers even here, notably of Jerome and Augustine, for whom studying the heavens was a lesson in the constancy of the divine covenant and a form of worship.[18]

On the other hand, unlike either Isidore or the Carolingians, Bede does not hold up the order of the heavens as a natural symbol of either the Christian order of divine law, or the political order of a Christian king as God's representative on earth. His perspective is Biblical: the heavens declare the glory of the Lord, and reveal his providence, wisdom and goodness to pious minds. Nor is Bede's piety that of late antique quadrivial astronomy, which presented the order of the universe as a model for the cultivation of human character.[19] As we shall attempt to demonstrate, particularly in our commentaries on the two works translated here, Bede's motivation and goals were driven by his own strong religious imagination, and what set his imagination ablaze was pondering God's created world as space, time and number. This scientific dimension of his imagination interlocked with other imaginative circuits in his thinking, notably the mysteries of salvation-history, and the place of his own people in that history. His comprehension of the physical world was of a piece with his understanding of what it meant to be a Christian, a monk and an Englishman.

BEDE'S TEMPLATE: ISIDORE OF SEVILLE'S *DE NATURA RERUM*

A century before Bede, the great Spanish scholar, Archbishop Isidore of Seville (560?–636), had composed a treatise, *De natura rerum* [*DNR*], 'On the Nature of Things', that provided a convenient synopsis of basic information about the natural world.[20] Isidore was in vogue in early Anglo-Saxon England, and Bede quickly grasped the opportunity to revise and refashion

17 McCluskey, *Astronomies and Cultures*, p. 4.

18 McCluskey, *Astronomies and Cultures*, pp. 31–32.

19 McCluskey, *Astronomies and Cultures*, pp. 124–36.

20 Ed. and trans. into French, Fontaine, *Traité*, pp. 163–327.

Isidore's manual and to supplement it with technical material from ancient and Irish sources in order to make it a useful instrument for his students.

Isidore wrote *DNR* certainly between 612 and 615, and probably in the spring of 613, at the request of the Visigothic King Sisebut.[21] Its immediate occasion may have been a total eclipse of the sun on 2 August 612, which followed on an eclipse of the moon in the previous year, and which seems to have provoked superstitious practices and apocalyptic fears that the king and Isidore wished to combat. Their purpose was to show that unusual phenomena in the earth or sky, like earthquakes or volcanoes or eclipses of the sun or the moon, were neither the work of demons nor signs of the end of the world, but rather part of the natural order of things ordained by God. Isidore's *DNR* can thus be seen as a Christian variation on the perennial theme of ancient cosmological treatises of this genre, notably Lucretius's *De natura rerum.*

Isidore's *DNR* is organized in three parts: (1) a 'hemerology', or science of the divisions of time, beginning with the day and the hour and extending to seasons, the year, etc. (chs. 1–8); (2) a cosmology or astronomy (chs. 9–28); and (3) a meteorology or science of terrestrial phenomena (chs. 29–48).[22] The cosmological and meteorological sections (chs. 9–48) follow an ancient tradition.[23] The 'hemerological' section (chs. 1–8) is alien to this tradition and comes from different sources. Its inclusion owes much to the new Christian concern with the liturgical hours and the fixed and moveable feasts of the ecclesiastical calendar.[24] Into the weft of this classical, pagan material, Isidore wove an allegorical commentary based on Ambrose, Gregory, Augustine, Jerome, and other doctors of the Church. The allegory begins with the vicissitudes of times and ends with a vision of hell in the fires of Mt. Etna.[25]

Seven diagrams, six of them wheels (*rotae*), appear in the manuscript tradition of *DNR*. There are wheels of the months (ch. 4), of the year (ch. 7), of the circles of the world (ch. 10), of the planets (ch. 23), and of the winds (ch. 37), as well as a wheel of the world, the year, and man (ch. 11). In addition, there is an oddly shaped, 'geometric' figure of the elements (also

21 Fontaine, *Traité*, pp. 1–3.

22 Fontaine, *Traité*, p. 7.

23 These correspond to chapters or sections in, among others, Aristotle's *Meteorologica*, books 5 and 6 of Lucretius's *De rerum natura*, and book 2 of Pliny's *Natural History*. Cf. Fontaine, *Traité*, pp. 8–9.

24 Fontaine, *Traité*, p. 7.

25 Fontaine, *Traité*, p. 12.

ch. 11). Isidore refers to these diagrams in his text, so he is responsible for their inclusion, but they are not original with him – they have a long though somewhat obscure history.[26] They are the reason that Isidore's *DNR* was often given the title of *liber* or *libri rotarum* in the medieval period.[27]

Isidore's *DNR* circulated in three recensions – a first or 'short' recension, a second or 'intermediate' recension, and a third or 'long' recension.[28] The first recension comprised 46 chapters, and appended an astronomical poem on the subject of eclipses by King Sisebut, which the king sent to Isidore.[29] The second recension added a 47th chapter, '*De partibus terrae*' (now ch. 48), and kept the poem of Sisebut's. The third recension of 48 chapters incorporated a 'mystical addition' to chapter 1,[30] and added a new chapter 44, '*De nominibus maris et fluminum*', but omitted the poem.[31]

Isidore's *DNR* reached southern England shortly after 670, in the form of the first or the second recension. Two separate batches of *lemmata* from *DNR* appear in the 'Leiden Glossary', a work compiled at Canterbury between the years 670 and 690 from the teaching of Archbishop Theodore and Abbot Hadrian.[32] In the year 685 Aldhelm, the abbot of Malmesbury[33] and future bishop of Sherborne, addressed a treatise on poetry to King Aldfrith of Northumbria in which he quoted a verse that he said was Isidore's. It occurs in Aldhelm's enumeration of the varieties of elision (or synaloepha) that are found in quantitative Latin poetry. 'Isidore', he says,

26 For the origin of Isidore's *rotae*, see Fontaine, *Traité*, pp. 15–18.

27 Not realizing this, Plummer (*BOH* 1, clxii, n. 8) proposed altering the phrase *de libris rotarum Isidori*, which he found printed in editions of Cuthbert's *De obitu Bedae* (On the Death of Bede) to *de libris notarum Isidori*.

28 Fontaine, *Traité*, pp. 38–45. Fontaine's overly complex account of authorial revisions to *DNR* has been questioned and his stemma accounting for the three recensions simplified by José Carlos Martín, in Codoñer, Martín, and Andrés, 'Isidorus Hispalensis Ep.', pp. 353–62. Wesley Stevens, 'Sidereal Time in Anglo-Saxon England,' pp. 136–37, has identified a fourth 'more elaborate version' of Isidore's *DNR* that also circulated in parts of England. Manuscripts of the fourth version include Exeter Cathedral, MS 3507 (ca. 960—986), London, B.L., Cotton Vitellius A XII (eleventh c.), and London, B.L., Cotton Domitian I.

29 *Epistula Sisebuti* (Fontaine, *Traité*, pp. 329–35).

30 *DNR* 1.3.17-52 (Fontaine, *Traité*, pp. 175–77).

31 Fontaine, *Traité*, p. 38.

32 See Lapidge, 'The School of Theodore and Hadrian', pp. 54–55, and *idem*, *The Anglo-Saxon Library*, p. 176.

33 Aldhelm has until recently been thought to have been appointed abbot of Malmesbury in 675, but Michael Lapidge, 'The Career of Aldhelm', pp. 48–52, demonstrates that 'the beginning of Aldhelm's abbacy cannot be reliably dated before 680, and possibly not before 685' (at p. 51).

'certainly elided vowels in the following way: *argutosque*[34] *inter latices et musica flabra*' [among the melodious waters and musical breezes].[35] The verse is actually line 2 of King Sisebut's poem, but in manuscripts of *DNR* before the ninth century the poem was not ascribed to the king. Hence, Aldhelm assumed that it was composed by Isidore.[36]

It is virtually certain that it was the second recension of Isidore's *DNR* to which Bede had access. He gives no evidence of knowing the 'mystical' addition to chapter 1, or chapter 44 (or, for that matter, Sisebut's poem). He quotes with minor changes a passage from Isidore's chapter 48, though this is not in itself decisive because Isidore's sentence (which is also found in *Etym.* 14.2.2) is verbally identical to Augustine, *The City of God* 16.17, and Bede could have taken it from either source.[37] However, the fact that both Isidore and Bede conclude with a chapter on the division of the earth – Isidore's chapter 48 and Bede's chapter 51 – would seem to confirm that Bede's copy of Isidore included what is now chapter 48. Clinching the evidence for Bede's access to the second recension is a phrase found only in one manuscript of that recension and in a small group of manuscripts of the third recension directly influenced by it. The phrase occurs in Isidore's chapter 37, 'On the Names of the Months'. In it he states that the North Wind is also called 'Aparctias' [*hic est Aparctias*], an observation which Bede echoes in his chapter 27, 'The Order of the Winds' [*qui et Apartias*].

Now, the manuscript of the second recension that contains this phrase is Fontaine's 'H' [= *Hispanus*].[38] H is a Spanish manuscript of the seventh century (636 X 686) – the oldest surviving exemplar of Isidore's *DNR*. It lacks the 'mystical' addition to chapter 1, and it lacks chapter 44, but it includes the poem of Sisebut and chapter 48 (hence, it is the second recension).[39] However, chapter 48 is added on fol. 24^{v} in a 'slightly later' hand[40] (end seventh/beginning eighth c.?), *after* the poem of Sisebut. Thus, H must be very close to the archetype of the second recension. Also at the bottom of fol. 24^{v} are inscribed two 'T-O' maps that happen to correspond closely to Bede's verbal description of the division of the earth (see Commentary on

34 *Argutusque*, Ehwald.

35 Aldhelm, *De metris*, ed. Ehwald, MGH, AA 15, 80.1-2.

36 Fontaine, *Traité*, pp. 74–75.

37 Bede, *DNR* 51.9-11, ed. Jones, CCSL 123A, 234.

38 Escorial, Real Biblioteca R.II.18, ff. 9^{r}–24^{v}. See Fontaine, *Traité*, pp. 20–23, 163, and 295.

39 Since the second recension lacks ch. 44, ch. 48 is numbered as ch. 47 in H.

40 Fontaine, *Traité*, pp. 20–21.

ONT 51). These do not seem to originate with Isidore; he makes no reference to them in his text, as he does with the 'wheels' mentioned above.[41]

Fontaine explores the possible routes by which *DNR* might have reached southern England toward the latter part of the seventh century – direct from Spain; through Ireland; from France via Irish missionaries to the Continent – without reaching any definitive conclusion.[42] He assumes that the work was subsequently diffused from southern England to Northumbria and in particular to Bede's monastery of Wearmouth-Jarrow**.** This may well be the case, but the possibility that Wearmouth-Jarrow had a more direct link with Spain is an attractive alternative. Perhaps a Spanish scholar had made his way to Wearmouth-Jarrow, or the monastery might have been in contact with Spanish scholarship in Ireland. All we can say of Aldhelm's copy of *DNR* is that it was not the third recension. But of Bede's copy, that is, the copy in the library of Wearmouth-Jarrow, we can say that it most resembles H, the oldest extant manuscript of *DNR* and one that never left Spain. And further, if Fontaine's conjecture that the third recension originated in Northumbria and spread from there to the Continent is valid, then the ancestor of the third recension might well have been the Wearmouth-Jarrow copy or one nearly identical with it. Fontaine thinks it almost certain that chapter 44 is a non-Isidorian interpolation of Northumbrian origin, and that the 'mystical' addition is more likely than not non-Isidorian – probably the work of a scholar thoroughly familiar with Isidore's style.[43] Finally, the unique and anomalous presence of the two T-O maps in H strongly hints at a connection between Spain and Wearmouth-Jarrow. The diagram is of unknown provenance; neither Isidore nor Bede had any hand in its construction so far as we can tell. It may have had a long pre-history. Nevertheless, the coincidence seems remarkable that, at approximately the time an anonymous scribe was appending the oldest extant T-O map to Isidore's final chapter in Spain,[44] Bede in Northumbria, borrowing from Pliny as well as Isidore, was composing a verbal description for his final chapter corresponding perhaps

41 Stevens, 'The Figure of the Earth,' pp. 272–73, assumes that it was Isidore himself who added this figure to his text in AD 613. Although Fontaine, *Traité*, carefully notes the *rotae* in each of the manuscripts he describes, he mentions the T-O map only in connection with H. Stevens states categorically (p. 273) that 'no completed second or third version manuscript exists without it'. However, there is no T-O map in St Gall 238 (a third recension MS: Fontaine's 'S').

42 Fontaine, *Traité*, pp. 75–78. For more on the possibility that Isidore came to England via the Irish, see Hillgarth, 'Ireland and Spain in the Seventh Century'.

43 Fontaine, *Traité*, pp. 45, 79–80.

44 The left-hand T-O map on fol. 24^{v} of H is probably, though not certainly, in the same hand as ch. 48. The right-hand map appears to be a later copy.

more nearly to that map than any other ancient source. Could the diagram have been inspired by Bede's words? Or did the Wearmouth-Jarrow copy of *DNR* display the same diagram as H, inspiring Bede to construct his chapter 51 as he did? We are left in the frustrating realm of conjecture.

BEDE'S TRANSFORMATION OF ISIDORE'S *DNR*

On the Nature of Things and *On Times* may be thought of as Bede's treatises on the spatial and temporal aspects of the physical universe respectively. Although Bede was an adept practitioner of the allegorical interpretation of scripture in his commentaries on various books of the Bible, he apparently considered Isidore's allegorizations extraneous to the purposes of his textbooks, and jettisoned them. Isidore was an encyclopaedic scholar, but he was not a specialist in the science of Easter reckoning, nor was it his purpose to offer students practical tools for theoretical understanding and accurate calculation of the ecclesiastical calendar. This divergence in intent between Isidore and Bede may have something to do with the widespread belief among contemporary Bede scholars that Bede had a low opinion of Isidore. We take up this question below.

In effect, Bede divided the chapters of Isidore's *DNR* to create his two textbooks. The first 23 chapters of Bede's *On the Nature of Things* correspond to the 'cosmological' section, chapters 9–28, of Isidore's *DNR*, while the remaining 28 chapters of *On the Nature of Things* (chs. 24–51) correspond to the 'meteorology' section, Isidore's chapters 29–48. Much of what Bede adds to Isidore is taken from Pliny, though he used other sources as well, notably the Irish pseudo-Isidore's *De ordine creaturarum*.[45]

As Fontaine points out, Bede isolated Isidore's 'hemerological' section (chs. 1–8) and reconstituted it separately as *On Times*.[46] To this material on the units of time of the solar calendar – the day, the week, the month, the year, Bede added (1) several chapters of technical explication of the nineteen-year cycle for reconciling the solar and lunar calendars that was used to calculate the proper date of Easter (the foundation of the disci-

45 'Bede, in contrast to Isidore, found Pliny a congenial and useful source on astronomical matters. In the fifty-one chapters of his *De natura rerum*, Bede used Pliny for much or most of the material in thirty-two chapters' (Eastwood, 'Plinian Astronomical Diagrams', p. 167, n. 19). Bede's use of pseudo-Isidore's *DOC* in *ONT* is documented by Picard, 'Bede and Irish Scholarship', pp. 139–44.

46 Fontaine, *Traité*, p. 7.

pline referred to as *computus*), and (2) a chronicle of the Six Ages of world history. Much of Bede's technical information came from Irish sources still available to us through the eleventh-century manuscript Bodley 309, a copy of an Irish *computus* anthology used by Bede himself.[47] For the universal chronicle, Bede turned again to Isidore.

BEDE'S ATTITUDE TOWARD ISIDORE

It is a 'fact' well known among Bede scholars that Bede cites Isidore by name only three times and then only to contradict him.[48] This, coupled with a disparaging remark about Isidore that Bede is said to have made on his death-bed, is largely responsible for the now widespread assumption that Bede not only held the Spanish scholar in low regard, but that he feared Isidore's errors, if left uncorrected, might infect his students with their untruth. However, in two well-reasoned articles, William McCready has challenged the prevailing opinion.[49] We revisit the issue here in view of the obvious importance of Isidore's work, whatever Bede's assessment of it, for *On the Nature of Things* and *On Times*.

It was Charles Plummer who first called attention to the 'curious' fact that Bede so seldom named Isidore.[50] Two of the three places where Bede did do so are in his *Retractation on the Acts of the Apostles*;[51] the third is in *The Reckoning of Time*. The *Retractation* contains Bede's second-thoughts, additions, comments, and corrections, to his *Commentary on the Acts of the Apostles*.[52] The *Commentary*, completed by 709, may have been his second sustained work of Biblical scholarship (after his *Commentary on the Apocalypse*); the *Retractation*, ca. 725–731, like *The Reckoning of Time*, belongs to his later years.[53]

(1) Isidore was the un-named source for Bede's identification, in his *Commentary*, of Simon Zelotes (Acts 1:13) with Simeon (or Simon), the son of Cleophas (or Clopas), who succeeded James as bishop of

47 Jones, 'The "Lost" Sirmond Manuscript of Bede's Computus', and Ó Cróinín, 'The Irish Provenance of Bede's *Computus*'.

48 See, e.g., Laistner, 'The Library of the Venerable Bede'; Jones, *BOT*, pp. 131–32; Fontaine, *Traité*, p. 79; Meyvaert, 'Bede the Scholar', pp. 59–60.

49 McCready, 'Bede and the Isidorian Legacy'; 'Bede, Isidore, and the *Epistola Cuthberti*'.

50 Plummer, *BOH* 1, xli, n. 4.

51 *Retractatio in Actus Apostolorum*, ed. Laistner, CCSL 121.

52 *Expositio Actuum Apostolorum*, ed. Laistner, CCSL 121.

53 Laistner, *Hand-List*, p. 20.

Jerusalem.[54] Apparently, Bede expected to find confirmation for this identification in earlier sources, and not finding any, had come to have doubts: 'Isidore thinks that this is the Simon who, after James the brother of the Lord, ruled the church of Jerusalem and under Trajan was crowned with the martyrdom of the cross when he was one hundred and twenty years old. And I followed him a while ago in my first book on the Acts of the Apostles. Not examining scrupulously enough the things that he wrote, but simply heeding his words, I supposed that he had learned them from trustworthy reports of the ancients'.[55] Even so, Bede says he dares not deny Isidore's identification, especially since the older authorities themselves are demonstrably in error at times. As one example of their unreliability, he notes that he repeated in his *Commentary* something that Jerome claimed Eusebius had said in his *Ecclesiastical History* (that the Thaddeus sent to cure King Abgar was the same Thaddeus who was one of the twelve apostles[56]), but when he later looked more carefully into Eusebius, he discovered that Jerome was mistaken: this Thaddeus was *not* the apostle Thaddeus, but rather one of the seventy disciples. Clearly, Bede did not enjoy being found in the wrong, and in conclusion he excused himself by laying the blame elsewhere: 'I think the error ought not to be imputed to me, when, following the authority of the great doctors, I trusted that those things which I found in their works could be accepted without hesitation'.[57]

In context, it will be observed that Bede is harder on Jerome than he is on Isidore (Isidore may have been mistaken; Jerome certainly was in error), but no one argues that Bede thought poorly of Jerome. We may reasonably conclude that when Bede began compiling his *Commentary on Acts* he was young enough to be awestruck at the reputation of 'the great doctors' (Isidore among them?), but by the time he came to write the *Retractation* he had experience enough to realize that the greatest of doctors were fallible and that their statements must be tested, and corrected when shown to be wrong.[58]

(2) Bede's second 'contradiction' of Isidore is nothing of the kind. In his *Commentary*, he explained that the boat or skiff (*scapha*) referred to

54 *Expositio*, CCSL 121, 10–11. Cf. *On Times* 22; *The Reckoning of Time* 66, AM 4069, trans. Wallis, p. 200.

55 *Retractatio*, CCSL 121, 107 (trans. Kendall, here and below).

56 *Expositio*, CCSL 121, 11.

57 *Retractatio*, CCSL 121, 107.

58 For an extended analysis, which comes to a similar conclusion, see McCready, 'Bede and the Isidorian Legacy', pp. 58–61.

in Acts 27:13-16, was a flimsy craft covered with rawhide.[59] He took this explanation from Isidore's *Etymologies* (19.1.21). In the *Retractation*, he comments: 'I wrote in my first book, following Isidore, that a skiff is a light vessel woven from willow and covered with rawhide; but subsequently looking through the writings of others [specifically, Vegetius] I found that small boats hollowed out from a single tree are also called skiffs …'.[60] He does not say that Isidore was wrong, or that the skiff in Acts must have been a hollow log. He simply gives a second definition of 'skiff'.[61]

(3) Bede mentions Isidore by name for the third time in chapter 35 of *The Reckoning of Time*. Once again, his remarks must be seen in relation to something he said earlier. Among the units of time that he discusses in *On Times* are the seasons. Isidore had taken up, in three consecutive chapters of *DNR*, 'the Years' (ch. 6), 'the Seasons' (ch. 7), and 'the Solstice and the Equinox' (ch. 8). Bede reversed this order, putting 'the Solstice and the Equinox' first, perhaps for the excellent pedagogical reason that, unlike Isidore, he intended to structure his definition of the seasons around them. In ch. 8 of *OT*, Bede reported the dates for the beginning of the four seasons as determined by 'the ancients' – the 6th ides of the months of February, May, August, and November (8 February, 10 May, 8 August, and 8 November) – 'so that the solstices and equinoxes would be in the middle of the seasons'.[62] In so doing, he silently ignored the dates proposed by Isidore – the 8th kalends of March, the 9th kalends of June, the 10th kalends of September, and the 9th kalends of December (22 February, 24 May, 23 August, and 23 November).

However, in *The Reckoning of Time* 35, a more ample treatment of 'the Four Seasons, Elements and Humours', Bede remarks that different authorities assign different dates to the beginning of the seasons, among them, 'Bishop Isidore the Spaniard', who in his *DNR* gives the dates mentioned above.[63] 'But the Greeks and the Romans [i.e., 'the ancients'], whose authority on these matters, rather than that of the Spaniards, it is generally preferable to follow, deem that winter begins on the 7th ides of November

59 *Expositio*, CCSL 121, 94.

60 Vegetius, *Epitoma rei militaris* 2.25.

61 Cf. McCready, 'Bede and the Isidorian Legacy', pp. 61–62.

62 Below, p. 111.

63 According to the received text, Isidore says 'the 7th [*uii*] kalends of December' (Fontaine, *Traité*, p. 203), although Bede states 'the 9th [*uiiii*] kalends' (ed. Jones, CCSL 123B, 393). However, the reading in the St-Gall manuscript of Isidore's *DNR* (Stiftsbibliothek 238) agrees with Bede's *uiiii*.

[7 November], spring on the 7th ides of February [7 February], summer on the 7th ides of May [9 May], and autumn on the 7th ides of August [7 August]'.[64] In addition to Pliny, the Scriptures, and Bishop Proterius and the Egyptians,[65] Bede adduces support from 'that man of the Church St Anatolius, in his work about Easter'. In short, Bede does not claim that Isidore is in error, but rather indicates his preference between alternative attempts to circumscribe the seasons with exact dates.[66] And perhaps in appealing to the authority of 'the Greeks and the Romans', Bede is being a bit disingenuous. Although Pliny puts the commencement of spring and summer on the 6th ides of February and May, respectively, he gives no definitive date for autumn and starts winter on the 3rd ides of November.[67] Anatolius appears to be Bede's sole source for the notion of defining the solstices and equinoxes as the midpoint of the seasons, the logic of which probably appealed to Bede.[68] He sounds a little defensive, as though he might have been criticized for ignoring Isidore's dates and felt the need to cloak himself in the broad mantle of the 'ancients'.[69]

Scholars who interpret these passages to imply that Bede regarded Isidore with suspicion have been influenced in their impressions by Cuthbert's mention of Isidore in his Letter on the Death of Bede. The relevant passage reads as follows in the text and translation offered by Colgrave and Mynors:

> *In istis autem diebus duo opuscula multum memoria digna, exceptis lectionibus quas cotidie accepimus ab eo et cantu Psalmorum, facere studuit, id est a capite euangelii sancti Iohannis usque ad eum locum in quo dicitur 'Sed haec quid sit inter tantos?' in nostram linguam ad utilitatem ecclesiae Dei conuertit, et de libris Rotarum Ysidori episcopi exceptiones* [*excerptiones*, Plummer][70]

64 *The Reckoning of Time* 35, trans. Wallis, p. 101. There is a one-day discrepancy between Bede's dates in *On Times* and his dates in *The Reckoning of Time*. This is undoubtedly owing to the fact that the beginning of the seasons had no computational relevance, and Bede is rarely dogmatic or concerned about precision and consistency on matters that are peripheral to his core project. Wallis, p. 321, observes that Bede himself 'at no point fixes calendar dates for the beginnings of the seasons'.

65 For the importance of the Scriptures, Proterius, and the Egyptians, see Wallis, *The Reckoning of Time*, pp. 320–21.

66 Cf. McCready, 'Bede and the Isidorian Legacy', pp. 46–47.

67 Pliny, *NH* 2.47.122-25.

68 For a thorough assessment of Bede's rather complex intents and purposes in chapter 35 of *DTR*, see Wallis, *The Reckoning of Time*, pp. 319–21.

69 Cf. McCready, 'Bede and the Isidorian Legacy', pp. 66–69.

70 *Exceptio* is a (frequently, legal) term meaning an 'exception, qualification, reservation' (*OLD*); it came to mean 'a thing extracted' (Souter) or 'prélèvement' (Blaise); in late British Latin it was confused with *excerptio* (Latham). Meyvaert, 'Bede the Scholar', p. 59, translated

> *quasdam, dicens 'Nolo ut pueri mei mendacium legant, et in hoc post meum obitum sine fructu laborent*'.
>
> During those days[71] there were two pieces of work worthy of record, besides the lessons which he gave us every day and his chanting of the Psalter, which he desired to finish: the gospel of St. John, which he was turning into our mother tongue to the great profit of the Church, from the beginning as far as the words 'But what are they among so many?'[72] and a selection from Bishop Isidore's book On the Wonders of Nature[73]; for he said 'I cannot have my children learning what is not true, and losing their labour on this after I am gone.'[74]

The passage involves textual difficulties and has been interpreted variously in some details. It is now generally assumed to mean that in addition to translating into English all or part of John's Gospel, Bede was making a collection of extracts (or corrections) from Isidore's *DNR* that would shield his students from Isidore's (presumably egregious) errors. Considering the fact that he began his writing career by employing Isidore's *DNR* as an armature on which to construct his two textbooks *On the Nature of Things* and *On Times*, into which he incorporated numerous extracts from Isidore, and that he continued to quote *in extenso* from Isidore in his recent work *The Reckoning of Time*, making a new set of extracts (or corrections) might strike one as an odd use of his precious final days.

An earlier generation of scholars understood one part of Bede's second project differently. Charles Plummer called it 'a translation of extracts from Isidore'.[75] This involves taking *exceptiones/excerptiones quasdam* as a direct object of *conuertit* (the first 'direct object' of the verb is the prepositional phrase *a capite … ad eum locum*). Jones takes it in that sense, and Fontaine, too, views the project as a translation.[76] However, Riché disputes

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exceptiones as 'corrections'. Plummer's *excerptiones* was based on the witness of a ninth-century St-Gall MS; this reading has strong support in MSS that have come to light since Plummer's day (see McCready, 'Bede, Isidore, and the *Epistola Cuthberti*', p. 90 and n. 51; according to McCready, idem, pp. 93–94, Meyvaert now accepts the reading *excerptiones* and no longer believes that Bede was hostile to Isidore). *Excerptiones* translates unambiguously as 'excerpts'.

71 This refers either to the 40 days from Easter to Ascension Day mentioned at the beginning of the paragraph or possibly to the whole period of Bede's last illness which began two weeks before Easter (Colgrave and Mynors, p. 580).

72 That is, John 1:1 to 6:9.

73 The *liber* or *libri Rotarum* is Isidore's *De natura rerum*.

74 Colgrave and Mynors, pp. 582–83; Plummer, *BOH* 1, clxii.

75 Plummer, *BOH* 1, xli, n. 4.

76 Jones, *BOT*, p. 131; Fontaine, *Traité*, p. 79.

the idea that it was a translation,[77] and Meyvaert flatly asserts: 'Bede's work on Isidore is often spoken of as a translation, but the Latin word order of Cuthbert's letter does not allow such an interpretation'.[78] Where the finest scholars disagree, we may consider the question open.

Finally, it is widely assumed that *mendacium* ['falsehood'] refers in some way to Isidore's *DNR*, as in Colgrave and Mynors's rendering: 'I cannot have my children learning *what is not true*', or Farmer's: 'I do not wish my students to read *lies*'.[79] But Fontaine finds in Bede's quoted words (*nolo ut pueri mei mendacium legant, et in hoc post meum obitum sine fructu laborent*) a different meaning:

> C. W. Jones, *BOT*, p. 131, sees there a criticism of the work of Isidore, which would be, according to him, the antecedent of the pronoun '*hoc'*. I think, rather, that Bede was condemning some unsuccessful attempts at translating Isidore's treatise into the Northumbrian language, and that he wanted to leave to his young pupils who were unskilled in Latin a proper version. I would translate thus: 'I do not wish my sons to read a false text, and in so doing to waste their time after my death' (*hoc* = *mendacium legere*).[80]

If Fontaine's reading has merit, then Bede's words could apply equally cogently to faulty student translations of the Bible.

A hundred and fifty years or so after Bede's death, King Alfred gently reproached Bede's generation of scholars for their failure to translate the great books of the Christian tradition into English.[81] At the end of his life, Bede may have harboured similar misgivings. In his Letter to Egbert (734), he remarks on the number of priests who do not know their Latin and notes that he has translated the Pater Noster and the Apostles' Creed into English for their benefit. Cuthbert's Letter conveys a sense of urgency. It is remarkable that one of the works that Bede was hastily finishing was a translation. Translating an extended text like John's Gospel was a task he apparently had never before undertaken. If both works were translations it would be more remarkable still – to concentrate on English translation in the few weeks remaining to him (he seems to have been conscious of his imminent death) after a lifetime of writing in Latin. When he was younger, he could assume that with time he would be able to remediate any deficiencies in his students' grasp of Latin. Now, on his deathbed, he may have feared that time

77 Riché, *Education and Culture*, p. 391, n. 193.
78 Meyvaert, 'Bede the Scholar,' p. 59.
79 In *Bede: Ecclesiastical History*, trans. Leo Sherley-Price, p. 359.
80 Fontaine, *Traité*, p. 79, n. 1 (trans. Kendall).
81 Alfred, *Preface to the Pastoral Care*.

had run out; that other teachers at Wearmouth-Jarrow were not as competent as he, or that their numbers were thinning; and that his pupils could not be prevented from mistranslating and introducing error (*mendacium*) into their reading of the gospels or the works of Isidore.

On this reading of the evidence, the fact that Bede was working on John and Isidore on his deathbed may be taken as testimony to their importance in his scheme of things. He particularly cherished John's Gospel because, while the other evangelists narrated the facts of Christ's life, John revealed 'the mysteries of the divine nature'.[82] He was engaged with Isidore from the earliest days of his career. As we have seen, he re-ordered and adapted for classroom use Isidore's *DNR* in his own *On the Nature of Things* and *On Times* beginning in 703, and then enormously expanded *On Times* into *The Reckoning of Time* in 725. He dropped the allegorical content of *DNR* (perhaps for the same reason that he avoided overt allegorization in the *Ecclesiastical History* – that is, his sense that allegory is proper to the word of God, but not to secular texts), and he often added or substituted material from Pliny and other sources. But in overall structure they remain adaptations of Isidore and *On the Nature of Things* even keeps Isidore's title.

That Bede named Isidore only three times may be simply a measure of how much he took Isidore for granted. He never hesitates to quote him in his biblical commentaries. To go by the indices in two recent translations, only Augustine and Jerome are cited more frequently than Isidore in *On Genesis* and only Augustine, Gregory, and Jerome in *On Ezra and Nehemiah*.[83] If we were to include Bede's use of source-marks as a form of naming, moreover, the number jumps dramatically. According to Jones's chart of source-marks in selected manuscripts of Bede's *On the Nature of Things*, fifteen of the 51 chapters of that work list Isidore as a source in one or another of these manuscripts.[84] We can not be entirely certain that all (or any) of these source-marks originated with Bede, but it seems likely both that some of Bede's marks have been lost and that few of those that remain have been added by later scribes. Moreover, we must also consider Bede's *modus operandi* as a writer. Particularly in his earlier works, Bede's habit was to lay down a sort of foundation course for his projected text using the work of a recognized authority, and then to expand, modify, elaborate and personalize his text by adding elements from other writers, particularly the greater Church

82 Bede, *Homelia* 1, 9 (ed. Hurst, *Opera Homiletica*, CCSL 122, 62).

83 See Kendall, *Bede: On Genesis*, pp. 355–59; DeGregorio, *Bede: On Ezra and Nehemiah*, pp. 258–60.

84 *DNR*, ed. Jones, CCSL 123A, 187.

Fathers. The foundational writer is often never named, while the Patristic addenda are clearly identified. We can see this process very clearly in the *Commentary on the Apocalypse*, where the foundation course is the work of Primasius – an author heavily exploited in fact, but named only once – while the intrusive passages from Gregory or Augustine are clearly flagged. We strongly suspect that the same dynamic is at work in *On the Nature of Things* and *On Times*, and that it is this habit of composition, and not a particular animus against Isidore, that led to the apparent suppression of his name.

Certainly, Bede did not regard Isidore as an expert on Easter reckoning and he looked elsewhere for the technical information he needed to pursue this subject. This is enough to explain the lack of 'warmth' that Jones speaks of in Bede's attitude toward Isidore.[85] But to draw from this the broad conclusion that he distrusted Isidore's works in general would leave us in the awkward position of having to explain why it was that he made so much use of him throughout his career when there was no compelling need for him to do so. Perhaps a more balanced view would be that Bede looked upon Isidore as a worthy successor of the great doctors of the Church whose encyclopaedic knowledge of the learning of the ancient world, distilled into such convenient manuals as *De natura rerum* and the *Etymologies*, could be endlessly drawn upon as from a deep well, always provided that, like those of other doctors, his statements be subject to verification and correction.

THE EASTER CONTROVERSY AND THE PEDAGOGY OF *COMPUTUS*

Bede's *On Times* innovates by amalgamating three types of Christian writing about time: the catalogue of the units of time, or hemerology; the technical and theological discourse on computing the date of Easter; and universal history. Isidore had dispersed these three genres in different books of the *Etymologies*, in *De natura rerum* and in his Chronicles. Bede fused them. Hidden beneath the matter-of-fact surface of *On Times* is an intense polemic about the correct principles for determining the date of Easter – principles which in Bede's view were bound up with both the integrity of nature as God's creation and the theological significance of Christ's death and resurrection. These are made explicit in *On Times* 15, 'The sacrament of the

85 Jones, *BOT*, p. 131.

Easter season', where Bede defends through spiritual allegory the criteria of the Alexandrian *computus*, as expounded by Dionysius Exiguus.

To fashion his treatise *On Times*, it was not sufficient for Bede simply to extract the hemerology from Isidore's *De natura rerum* and package it as a separate work. Rather, Bede used Isidore's hemerology as a conceptual framework for a totally different type of book – a manual of Christian time-reckoning, or *computus.* Just as he Christianized Isidore's cosmology by setting it in the context of creation, so also did he transform the hemerology into the architecture of a science of time that encompassed both the calculation of Easter and the unfolding of salvation-history. Some background to both the Paschal controversy and the evolution of the world-chronicle as a genre of Christian historiography is therefore in order.[86]

The rules for determining the date of the annual celebration of Easter were a matter of contention within the Church for many centuries. Several interconnected issues made the resolution of this question difficult. The historic Crucifixion and Resurrection took place during the Jewish feast of Passover, and its theological significance was bound up with the Passover message of sacrifice and liberation. The Jewish calendar is lunar, so the beginning of Passover – the 14th day of the month of Nisan – will not fall on the same date each year in a solar calendar, such as the Julian calendar used in the Roman Empire and in medieval Europe. Secondly, most Christians from the second century onwards chose to celebrate Easter on the historic weekday of the Resurrection, Sunday. Since 14 Nisan can fall on any day of the week, what was the range of dates within Nisan on which Easter could be celebrated? Should Christians celebrate on 14 Nisan when it fell on a Sunday? Or was 14 Nisan out of bounds, either because it would entail celebrating at the same time as the Jews (what came to be called 'Quartodecimanism') or because Easter should mark the Resurrection, and not the Passion of Christ? On which day was Christ crucified: on 15 Nisan (as the Synoptic Gospels relate) or on 14 Nisan (as John tells it)? The criteria for Passover laid out in Exodus 12:2 also state that Nisan is 'the first month' of the year, that is, it falls in spring. But spring is a solar season, not a lunar phase. When does 'spring' begin? At the astronomical equinox? And if so,

86 What follows is a summary of the historical sketch of *computus* and the Paschal controversy found in Wallis, *Reckoning of Time*, pp. xxxiv–lxiii, which contains references to the literature on this subject to 1999. Important works published since then which bear on the history of the Christian calendar prior to Bede include Declercq, *Anno Domini: the Origins of the Christian Era*, McCarthy and Breen, *The Ante-Nicene Christian Pasch: De ratione paschali*, and Mosshammer, *The Easter Computus and the Origins of the Christian Era*.

when exactly is the equinox? Given all the above, what are the permissible dates in the Julian calendar on which Easter can fall?

From about the beginning of the third century, the position of the Roman Church was that Easter should never fall before 16 Nisan, because Easter should celebrate the Resurrection. Other churches, however, held differing views, arguing that 14 or 15 Nisan should be acceptable because the feast is a commemoration of Christ's redeeming sacrifice. When the council of Nicaea in 325 condemned Quartodecimanism, the Alexandrian church interpreted this to mean that if 14 Nisan fell on a Sunday, Easter must be postponed until the following Sunday. To put it another way, the Easter limits were from the fifteenth to the twenty-first day of the first lunar month of spring. Furthermore, 'spring' was defined by Alexandria as beginning on the equinox. The earliest known table of Easter dates based on the equinox criterion was published by Bishop Dionysius of Alexandria between 257 and 265. But here again, Rome differed, preferring the date for the entry of the sun into Aries (18 March in the Julian calendar) as the 'natural' beginning of spring. The waters were further muddied by disagreement over the calendar date of the equinox. The Romans clung to the traditional date marked in Julius Caesar's calendar – 25 March. The Alexandrians, who had access to superior astronomical advice, took account of the error in the Julian calendar that caused the actual equinox to slip back in the calendar, and adjusted their date to 21 March. This date, combined with the lunar limits 15–21, meant that Alexandrians could celebrate Easter between 22 March and 25 April. The latter date was a whole month after the former, plus seven days to take in the following Sunday, for if 15 Nisan fell on 21 March, that entire lunar month had to be disregarded, and the following lunar month would count as the first lunar month of spring. The Romans fixed the lunar limits at 16–22; but they also had an arbitrary rule about never celebrating Easter after 21 April, to avoid any coincidence of Holy Week with the celebration of the festival of the City's foundation on that date. At some point in the fourth century, the old equinox date was dropped, but the other criteria remained in force for a longer time.

There was little incentive to change the criteria, because in practical terms they made little difference. For most of the fourth and fifth century, Rome and Alexandria actually celebrated Easter on the same date, even if they arrived at that date by different methods. However, the controversy continued to simmer, and it generated, at least from the Alexandrian side, a distinctive genre of literature consisting of a table of projected Easter dates, combined with an explanation of the principles and formulas for

determining them. This essentially polemical type of technical tract would become the staple of the ensuing discussions.

The Alexandrians were at an advantage in this debate, because there was a Greek as well as Jewish tradition of adjusting a lunar calendar to a solar one such as the Romans used. This adjustment had to take place because the equinox is a purely solar event. But matching up the *days* of a lunation to the *dates* in a Julian calendar presents numerous problems. Twelve lunar months of about 29½ days makes a lunar year of 354 days – eleven days shorter than the solar year. This means that if the moon is three days old on 1 January this year, it will be 14 days old on 1 January next year – or 15 days if it is a leap year of 366 days. However, this is only a coarse approximation. The average lunation of 29.5306 days, when divided into the length of the mean tropical year of 365.2422 days, yields 12.3683 lunar months. This decimal excess of .3683 cannot be reduced to a common fraction: it is an irrational number, which means that no number of lunar months can ever be fitted into any number of whole solar years. In other words, it is not possible to create a flawless cycle of Easter dates in perpetuity. However, a more or less accurate cycle can be devised. The common fraction which most closely approximates the decimal excess is 7/19 (.3684), with 31/84 (.3690) as a runner up. This means that one could just about get nineteen lunar years of 12 lunar months each into nineteen solar years if one inserted 7 additional lunar months along the way. These 'embolismic' months would be added in about every third year (when the 11-day lag of the moon behind the sun would amount to a whole lunar month and a bit more), though exactly where they should be inserted, and how this might affect the calculation of the Easter full moon, remained thorny issues. Finally, the nineteen-year cycle ends with one more *calculated* lunar day than necessary, so at some point a day will have to be arbitrarily dropped from the lunar count. This is the 'leap of the moon'.

The nineteen-year cycle was, from an astronomical point of view, the best option, and its high level of accuracy was used to bolster the Alexandrian argument for primacy in the Paschal debate. But the eighty-four-year cycle with 31 embolismic months had a special practical advantage: 84 is evenly divisible by 28, and the weekdays on which any given calendar date will fall repeat over a cycle of twenty-eight years (7 days of the week, multiplied by the four years of the leap-year cycle). If one wishes to make a prospective table of future dates of Easter, an eighty-four-year cycle would be superior, because it would be truly cyclical for all criteria – lunar phase, solar date, and Sundays. In Bede's time, the British and some Irish communities, notably the *paruchia* of Iona, continued to use a version of

the eighty-four-year cycle. The cycle had its defects, however; over eighty-four years it would accumulate an error of two days in the lunar reckoning.

The Alexandrian nineteen-year cycle, despite its inability to accommodate a cycle of Sundays, was beginning to win adherents in the west, especially after a ninety-five-year table based on this cycle, covering AD 437–531, and fully adapted to Julian calendar dates, was published under the name of Bishop Cyril of Alexandria. In the years 444 and 455, there were serious discrepancies between the Roman and Alexandrian Easter dates. Pope Leo I's archdeacon Hilarius commissioned the mathematician Victorius of Aquitaine to explain the differences between the Roman and Alexandrian systems, and suggest a solution. In 457, Victorius published new tables which abandoned the eighty-four-year cycle in favour of the nineteen-year cycle, but his rules for translating this cycle into dates for Easter did not completely coincide with Alexandrian practice. He retained the old Roman terminus of 18 March for 14 Nisan, as well as the Roman lunar limits of 16–22. Moreover, his table actually listed alternative dates for Easter: a 'Latin' date arrived at by his criteria, and a 'Greek' date, which to compound the confusion was not actually the Alexandrian date. Despite these flaws, Victorius's tables enjoyed considerable success in the West because Hilarius eventually became pope. Since Victorius addressed his table to Hilarius, this gave the impression that the table had received papal endorsement. Victorian tables were used in the Gaulish church, and probably in many parts of England and Ireland before and even during Bede's lifetime.

We are accustomed to viewing the English Paschal controversy as a conflict between Iona and Rome because of the prominence Bede gives to the meeting at Whitby in his *Ecclesiastical History.* But in his computistical writings, Bede actually devotes as much or more space to the defects of Victorius's system as to the problems of the 'Celtic' calculation. In *On Times*, Bede in fact does not mention either of these systems for finding the date of Easter. His aim is strictly to expound the Paschal table of Dionysius Exiguus. Bede is rather discreet about Dionysius, naming him only on a few occasions in *On Times*. He probably knew little about him, and perhaps in the light of Victorius's association with the papacy he did not wish to make much of the obscure identity of the author of the Paschal tables he embraced. Dionysius was an eastern monk residing in Rome in the early decades of the sixth century, and he seems to have had few connections. He translated the Cyrillian ninety-five-year table into Latin, constructed a continuation for a further ninety-five years (AD 532–627), attached a prologue claiming that the Alexandrian system was approved by the council of Nicaea as well

as a translation of the Alexandrian computistical formulae or *argumenta*, and sent the ensemble to an unidentified bishop Petronius. The work had little immediate impact, but in 525 another discrepancy loomed between Victorius's date for Easter and the Alexandrian date. Dionysius addressed a letter to the *primicerii* of Pope John I, Bonifatius and Bonus, explaining why Victorius's faulty system had produced this anomaly. The death of Pope John prevented Dionysius from receiving an official hearing, but his tables were diffused by others, notably Cassiodorus and Isidore of Seville, who reproduced them (not entirely faithfully) in *Etymologies* 6.17. When exactly Dionysius's tables supplanted Victorius's in Rome has not been established, and thereby hangs a certain degree of uncertainty over which 'Roman' system was being diffused in England and Ireland in the years preceding, or even following, the encounter at Whitby. What is perfectly clear is that Bede embraced the Alexandrian criteria expounded in Dionysius's table – a nineteen-year luni-solar cycle, lunar limits of 15–21, the vernal equinox on 21 March, and Paschal limits of 22 March–25 April. He adopted Dionysius's format of an 8-column Easter table, showing not only the date of Easter itself, but also the date of the Paschal full moon, the age of the moon on Easter Sunday, and the critical lunar and solar data (epacts and concurrents) for checking the calculation. Dionysius's table numbered the years according to his own chronology of the year of the Incarnation, followed by the indiction. Bede explained the table, column by column, in *On Times* 14. But when he composed the world chronicle which closes *On Times*, he adopted the traditional *annus mundi* chronology. This was a deliberate choice, for not only was the genre of Christian universal history bound up with the *annus mundi* chronology, but Bede had a particular argument to put forward about that chronology.

THE CHRISTIAN WORLD-CHRONICLE

Bede's understanding of time in its totality and in relation to history articulates a Christian conception that was essentially different from the classical. The Greco-Roman world had regarded the movement of history as cyclical, a progress away from, and a return to, a common point such as a universal disaster – eternal generation, destruction, and regeneration.[87] Plato describes the cyclical course of the world in a story told by the Stranger in the *Statesman*:

87 Cf. Eliade, *The Myth of the Eternal Return*.

> There is a time when God himself guides and helps to roll the world in its course; and there is a time, on the completion of a certain cycle, when he lets go, and the world being a living creature, and having originally received intelligence from its author and creator, turns about and by an inherent necessity revolves in the opposite direction.[88]

Perhaps in consequence of this conception of the cyclical nature of time, numbers which referred to the age of mankind tended to be vague or impossibly large. Plato speaks of Athens being founded nine thousand years previously,[89] and Pliny refers to observations of the stars which the Babylonians maintained for seven hundred and thirty thousand years.[90]

The Christian concept of time was linear because Christians, like Jews, believed that the universe was created, not eternal, and that it would one day end. It owed much to Jewish thought, particularly the idea of a 'chosen people' and the expectation of a messiah. There is a specific anticipation of the Christian idea of history in the book of Daniel, in which Daniel has a vision of four successive kingdoms that are to be followed by the eternal reign of the Son of man (Dan. 7:1-27).[91] In the Christian view, time had a beginning,[92] middle, and end, corresponding to Creation, Incarnation, and Last Judgement. Each period was a part of God's plan which deserved to be studied. These periods were rapidly subdivided. Paul mentions a period from Adam to Moses (Romans 5:14), and Matthew assigns three periods from Abraham to Christ: 'So all the generations from Abraham to David are fourteen generations; and from David until the carrying away into Babylon are fourteen generations; and from the carrying away into Babylon unto Christ are fourteen generations' (Matt. 1:17). Matthew's threefold division, with the addition of the period from Adam to Abraham (halved by the deluge) and the period from Christ onward, gave rise to the Patristic commonplace of the Six Ages of the world, which Bede enlarged into a mystical conception of great grandeur.[93]

88 *Statesman*, Steph. 269, trans. Jowett, 2, 297.

89 *Timaeus*, Steph. 23 (Jowett, 2, 9).

90 Pliny, *NH* 7.56.193.

91 Cf. Lietzmann, *The Beginnings of the Christian Church*, p. 25.

92 The notion that time has a beginning largely originates in Judaeo-Christian thought. According to Aristotle, 'as to the eternity of time all thinkers, with but a single exception, appear to agree; for they declare it to have had no origin … . Plato is the only thinker who ascribes an origin to time: it originated he declares, simultaneously with the universe, to which he also ascribes an origin' (*Physics* 8.1, trans. Wheelwright, *From Natural Science*, p. 48).

93 See especially his excursus on the Six Ages of the World in *On Genesis* 1.2:3a/b, trans. Kendall, pp. 100–5; his concluding chapters (67–71) to *The Reckoning of Time*, trans. Wallis, pp. 239–49; and his Hymn on the Six Ages, Appendix 1, below.

Bede included a world-chronicle in both his treatises on time-reckoning. In each case, the chronicle was presented as an illustration of the division of time called *aetas* or ‘age’. The notion of the ‘age’ marked this particular genre of Christian historiography from its inception, and had theological consequences which spilled over from history into eschatology.[94]

The Christian world-chronicle is to a considerable degree an adaptation of the Hellenistic genre of synchronized histories of the various communities of the Mediterranean world. For Christians, synchronization had a theological message: true history was the history of salvation, planned and executed by God, and all the separate histories of the nations were tributaries of this great historical stream. During the second and third centuries, the comparative youth of their religion subjected Christians to mockery. The replies made by several of the early Fathers suggest that the principal scoffers were trained in Greek philosophy. In the course of their replies, these Fathers not only argued for the antiquity of the Christian religion beyond all others through its parent, Judaism, but also asserted that Moses was the ultimate fountainhead of all pagan wisdom. The second-century Christian apologist Tatian argued:

> Therefore, from what has been said it is evident that Moses was older than the ancient heroes, wars, and demons. And we ought rather to believe him, who stands before them in point of age, than the Greeks, who, without being aware of it, drew his doctrines [as] from a fountain.[95]

For this kind of apologetics to be successful, a comparative chronology of Hebrew and Greco-Roman history, never before attempted, was needed.

A contemporary of Tatian, Theophilus, bishop of Antioch (d. ca. AD 185), was among those who adduced evidence to prove the antiquity of the faith through Judaism. In the three books of *Theophilus to Autolycus*, Theophilus attempted to persuade his friend Autolycus of the merits of Christianity. The third book contains the arguments concerning the antiquity of Judaism, and it is here that we find the earliest extant Christian chronicle, which sets the form for all the chronicles to come.[96]

The most influential patristic practitioner of this genre, however, was Eusebius of Caesarea (263–339). His *Chronicle* (*Chronikoi Kanones*) is a

94 See the commentary on ch. 66 in Wallis, *The Reckoning of Time*, pp. 353–66, and the literature cited there. A particularly profound debt is owed to the seminal article by Richard Landes, ‘”Lest the Millennium Be Fulfilled”’.

95 *Address to the Greeks* 40, ANF 2, 81. The same ground is covered by Theophilus, *Theophilus to Autolycus*, and by Clement of Alexandria, *The Stromata*.

96 *Theophilus to Autolycus*, ANF 2.

time-line, beginning with Abraham, that gradually ties the histories of the ancient Near Eastern empires, the Greeks and the Romans into a single, continuous chronological braid. Eusebius's *Chronicle* was translated into Latin by Jerome, who added entries to AD 378; thereafter, continuations were composed by Prosper (ca. 390–463) to 455 and Marcellinus Comes to 534. Bede had access to this Latin version of Eusebius, but in *On Times*, he relied on the chronicles of Isidore of Seville, for reasons which will be explained below.

The chronological backbone of Eusebius's *Chronicle* was a running total of years from the birth of Abraham. In his preface, however, Eusebius laid out the framework for a periodization of sacred history into 'ages'. Eusebius divided the span between Abraham and Christ's earthly ministry into four periods, punctuated by the Exodus and the construction of the first and second Temples, and added two periods preceding Abraham, divided by the Flood. Eusebius's decision to omit the first two ages from the *Chronicle* was based in part on the problematic chronology of this period, since the number of years and generations of the Patriarchs differed between the Septuagint and Hebrew versions of the Old Testament. Tacitly, however, Eusebius favoured the Septuagint figure, because he dated the beginning of Christ's ministry to *annus mundi* 5228. Christ therefore would have been born in AM 5197 or 5198; Jerome preferred 5199, which became the conventional date in most Western world-chronicles.

Eusebius's somewhat casual essay in periodization, however, attracted a great deal of attention, notably from Augustine, who transformed the *Chronicle*'s six ages of pre-Christian history into six ages of world history by merging two of Eusebius's eras and extending the last to encompass all time since the advent of Christ. For Augustine the number six held a special fascination, both on the level of number symbolism and as a Biblical *figura* (particularly in connection with the six days of Creation). He was by no means original in this respect, nor was his schema of six ages entirely unprecedented. Nonetheless, Augustine's enormous influence, especially in the west, made him the principal spokesman for these concepts, and a major influence on Bede. Augustine proposed two analogies which Bede would adopt and elaborate. First, each age of world history was like a day, with an optimistic dawn, a zenith, and a troubled period of decline. In *On Genesis against the Manicheans* (*De Genesi contra Manichaeos*) and particularly in *The City of God*, Augustine also developed a comparison between the six ages of world history and the six ages of human life which Bede paraphrased in *On Times* 16. However, Augustine was not particularly concerned with

chronological issues, including the discrepancy between the Septuagint and Hebrew tally of the years of the Patriarchs. He was not even consistent about whether the Sixth Age began at the Incarnation or with the inception of Christ's ministry.

It was Isidore of Seville who took the crucial step of fusing Augustine's numerological theology of history with Eusebius's chronology. Isidore's two chronicles – a self-standing *Chronicon* and the chronicle incorporated into *Etymologies* 5.29 – constitute the first Christian world-history to begin with Creation and to lay out the past in six *aetates* duly dated according to the *annus mundi*. Isidore's chronology was based, like Eusebius's, on the Septuagint. He organized the first three ages according to the generations of the Hebrew Patriarchs, and then according to the reigns of the judges and kings of Israel. After the fall of the Jewish kingdom, the chronological framework was supplied by the kingdoms which ruled over Judea – Macedon, Ptolemaic Egypt, and Rome. He dated reigns according to their closing year (not their inception), and also fixed the beginning of the Sixth Age definitively at Christ's birth. All these features, and much of the substance of Isidore's chronicles, were taken over by Bede in *On Times.*

Bede nonetheless made two very significant changes. First, he stripped out Isidore's chronological marker dates. The result is that Bede's chronicle provides a *sequence* of the events in each age, and in some cases the *duration* of those events (notably the length of reigns), but it avoids explicit dating. Given that Bede re-inserted Isidorean marker dates in the revised version of the Chronicle in *The Reckoning of Time* 66, their omission in *On Times* may be connected with Bede's other great alteration to Isidore. Bede set aside the Septuagint dating of Eusebius and Isidore, and substituted his own innovative chronology, based on the 'Hebrew' account of the first two Ages found in Jerome's Vulgate translation of the Bible. The Septuagint assigned two thousand two hundred and forty-two years to the First Age (Adam to Noah); Bede and Jerome calculated only one thousand six hundred and fifty-six. Bede likewise reduced the Second Age (Noah to Abraham) from nine hundred and forty-two to two hundred and ninety-two years. The result was to shave more than one thousand two hundred years from the total age of the world to date, and to reposition Christ's birth at AM 3952. And in fact, the only point at which Bede provides an explicit *annus mundi* date within the Chronicle is at the birth of Christ.

None of this would have caused any controversy had it not been for the notion that because the six World-Ages corresponded to the six days of creation, each Age must be one thousand years in length. This assumption

rested on 2 Peter 3:8 (echoing Psalm 90:4): 'with the Lord one day is a thousand years, and a thousand years as one day'. Bede's ages were not each one thousand years long, but then, neither were Isidore's. However, by dating Christ's birth to AM 5196, Isidore at least put the beginning of the sixth World-Age close to the start of the sixth millennium. For Bede, as for others, this raised a serious problem. If the sixth World-Age were destined to last one thousand years and its beginning were known, it would be possible to predict precisely when it would end. Moreover, it was scheduled to end fairly soon – about AD 800 to be precise. But Christ himself forbade such speculation – indeed, he claimed that even he did not know when the End would come; only the Father knows that (Matt. 24:36; Mark 13:32; cf. Acts 1:7). Before Bede, several writers had attempted to defuse such apocalyptic speculation by tinkering with the Eusebian *annus mundi* chronology to postpone the millennium. Bede took a more radical approach by uncoupling the six World-Ages from a Septuagint *annus mundi* chronology that implicitly supported the thousand-year world-age theory. The consequence was that a few years later, at a banquet hosted by Bishop Wilfrid, someone publicly accused Bede of heresy with respect to this chronology. Bede would respond, in the first instance, with the *Letter to Plegwin*; later he would restate and reinforce his revisionist chronology in ch. 66 of *The Reckoning of Time.* Despite the protests of all of these scholars, the Six Ages continued to be associated with millenarian thought.[97] Still, Bede's orthodox formulation did much to dampen millenarian speculation in the Carolingian period and beyond.[98]

BEDE'S SCIENCE: CONTINUITIES AND NEW DIRECTIONS

On the Nature of Things and *On Times* are important for our understanding of some of Bede's most ambitious and original writing. His commentary on the opening chapters of Genesis,[99] on which he laboured for many years, contains profound and original reflections on the creation of the universe, and on the structure and spiritual meaning of time (e.g., in his exegesis of the story of Noah). Issues surrounding nature and time are woven into other works by Bede as well, for example his innovative exegetical writings

97 Cf. Jones, *Saints' Lives*, p. 25.

98 Landes, '"Lest the Millennium Be Fulfilled"', p. 176.

99 *In Gen.*, ed. Jones, CCSL 118A; trans. Kendall, On *Genesis*.

on the Tabernacle and the Temple.[100] The interest in time-reckoning which *On Times* stimulated and the shocking accusation of heresy that Bede had to face over the world-ages chronology led directly to *The Reckoning of Time* and the computistical letters. In *The Reckoning of Time* Bede re-united cosmology and time-reckoning to form a unified science of *computus* that would become the framework for Carolingian and Scholastic basic scientific education.

Bede's achievement as a student of what we can, for the sake of convenience, call 'science' has recently received renewed attention in Anglo-American and German scholarship. On a wider stage, Hervé Inglebert's *Interpretatio Christiana* provides a stimulating framework for considering Bede's role in the process of adapting ancient cosmology and geography to a Christian *doctrina* that had a distinctively un-classical approach to time and history. Moreover, re-assessments of medieval science by Edward Grant and others make the case that theology and creative scientific thinking were mutually dependent, and neither alien nor hostile to one another.[101] These new trends in scholarship add to the interest of *On the Nature of Things* and *On Times*. Bede presented himself as a teacher to his people and his age, and these two short works show him selecting, editing, and clarifying a mass of difficult and sometimes dangerous material. He insisted that his reader understand the mathematical and physical basis of time, and though he was dependent on his textual sources, he also included observations of his own. But Bede is also a Christian exegete who thought deeply and earnestly about how salvation-history connected to natural history and the history of the peoples of the earth. To comprehend his religious mentality, we have to take on board his views on 'science' – and vice versa.[102]

Another domain in which Bede's work as a computist exerted a particularly significant influence is early medieval 'numeracy'.[103] Bede's competence as a mathematician is under-appreciated, partly because it takes an effort of the imagination to realize just how remarkable this competence was. Mathematics was for him not a science, but a tool for calculating the duration of relative movements of the sun, the moon and the stars. The opera-

100 *De tabernaculo*, ed. Hurst, CCSL 119A; trans. Holder, *De templo*, ed. Hurst, CCSL 119A; trans. Connolly.

101 Ingelbert, *Interpretatio Christiana*, esp. ch. 1; Grant, *God and Reason in the Middle Ages.*

102 The dialogue between 'science' and theology in *ONT* and *OT* forms much of the burden of our commentary on these texts. For an overview of Bede's conception of nature and knowledge about nature ('science') see Wallis, '*Si Naturam Quaeras*' and 'Bede and Science'.

103 See the perceptive comments of Contreni, 'Counting, Calendars, and Cosmology'.

tions involved did not go beyond simple addition, subtraction, multiplication and division, and the use of fractions. He knew nothing of the higher mathematics of Antiquity, and he made no advances in arithmetic that could be passed on to the future. So, what is there to remark? A general observation may help to set the stage. Alexander Murray describes the four to five centuries before the year 1000 as a 'dark age' of mathematics. Numeracy was rare and confined to the Church. However elementary Bede's skills may seem to modern eyes, he was the probably the most accomplished mathematician of western Europe in this long period.[104] The Easter controversy, which demanded mathematical reasoning, was largely responsible. Theodore and Hadrian inaugurated the study of 'ecclesiastical arithmetic' in the schools of Canterbury in the 670s. In a broad sense, they may be considered refugees from the spread of Islam, and Murray hazards the guess that they imported the mathematical skills of the Near East, Egypt and Syria, among other disciplines, to southern England. But even before their arrival in England, they had been in Rome when Benedict Biscop and Wilfrid made their first visits there. Wilfrid studied Roman methods for calculating Easter, which may have owed something to Theodore's studies of the *computus* in Constantinople, and vigorously supported them at the synod of Whitby in 664.[105]

The few men who studied arithmetic in this five-hundred-year period invariably complained of its difficulty: Aldhelm is an example. And they seem invariably to have studied it as adults.[106] Bede is, apparently, an exception to both generalizations. He never complains about the difficulty of mastering arithmetic. Indeed, he seems pretty much to take it for granted as a quite unremarkable, but useful, tool. And, he evidently studied it as a boy because he issued his first sure-footed textbook on the *computus* at about the age of thirty, doubtless after teaching the subject for much of the previous decade. Ceolfrith, who was one of his teachers as a boy, had been to Rome on one occasion with Benedict Biscop and was a protégé of Wilfrid's at Ripon. There is some dispute as to whether he was really the author of the Letter to Nechtan, a lucid exposition of the Easter controversy from the 'Roman' perspective, which Bede inserted under his name into the *Ecclesiastical History*.[107] But it is clear evidence that he was considered an authority on the *computus*, and he may have been the master who taught Bede arithmetic as a boy.

104 Murray, *Reason and Society*, pp. 141–61.
105 Bede, *EH* 3.25.
106 Murray, *Reason and Society*, pp. 148 and 152.
107 Bede, *EH* 5.21.

What aids to calculation Bede may have learned from Ceolfrith or others we do not know. Two systems of representing numbers were in general use: Roman numerals and Greek letters. There is no evidence that Greek letters were used for calculation. As well as being particularly liable to be miscopied, Roman numerals, lacking a one-to-one correspondence between integers and place-values, are notoriously clumsy to calculate with.[108] Bede may have had access to some short cuts to calculation, but we have no idea what they might have been. The system of finger-calculation that he describes in the first chapter of *The Reckoning of Time* strikes a modern reader as more ingenious than useful. Similarly, his account in chapter 4 of 'The Reckoning of Duodecimal Fractions' does not advance much beyond the naming of parts. The abacus, the 'high-speed' calculator of Antiquity, seems to have been forgotten until the time of Gerbert in the late tenth century.[109] Despite these handicaps, Bede could solve a complex arithmetical problem with seeming ease and without bothering to say how he did so, and then devise simple algorithms to enable his readers to replicate the results without having to perform any difficult operations. A prime example is chapter 21 of *On the Nature of Things*, which he titled: 'Method for Determining the Course of the Moon through the Signs of the Zodiac'. We attempt to unpack the computistical reasoning that underlies this chapter in Appendix 2.

THE TRANSMISSION OF *ONT* AND *OT*

Within a generation of his death, Bede's works were in demand both in England and on the Continent, and by the Carolingian period he had become a recognized authority, whether as an exegete or as a schoolmaster, to be named in the same breath with the Fathers of the Church – Ambrose, Augustine, Jerome, and Gregory.

For reasons that have already been hinted at,[110] the transmission history of *On the Nature of Things* and *On Times* cannot be properly understood without taking the history of *The Reckoning of Time* into account as well. In the Preface to the latter work, Bede remarks:

108 On the difficulty of performing calculations with Roman numerals, see Wallis, *The Reckoning of Time*, pp. 254–63. As Murray, *Reason and Society*, p. 163, says, 'Roman numerals manifested and partly occasioned the paralysis of early medieval arithmetic'.

109 Murray, *Reason and Society*, p. 163. Stevens, 'Scientific Instruction', p. 97, finds evidence for the abacus in Aldhelm's use of the term *calculi*, but it seems more likely to be an abstract reference to arithmetic or calculation than a specific one to a counting board.

110 See above, pp. 4–5.

> Some time ago I wrote two short books in a summary style which were, I judged, necessary for my students; these concerned the nature of things, and the reckoning of time. When I undertook to present and explain them to some of my brethren, they said that they were much more concise than they would have wished, especially the book on time, which was, it seems, rather more in demand because of the calculation of Easter. So they persuaded me to discuss certain matters concerning the nature, course, and end of time at greater length. I yielded to their enthusiasm, and after surveying the writings of the venerable Fathers, I wrote a longer book on time.[111]

Insofar as *The Reckoning of Time* was regarded as an enlarged revision of *On Times*,[112] it tended to take the place of the earlier work, and by the same token, since *On the Nature of Things* and *On Times* were conceived of as companion texts, in the absence of *On Times*, *On the Nature of Things* tended to be transmitted along with its 'replacement', *The Reckoning of Time*.

Keeping these relationships in mind, it is instructive first of all to look at figures compiled by Joshua Westgard.[113] Surveying the surviving manuscripts of all Bede's works from the eighth through the fifteenth century, Westgard finds that *The Reckoning of Time* with 146 manuscripts is second only to the *Ecclesiastical History* (158) in total numbers, while *On the Nature of Things* is fourth with 113 and *On Times* is thirteenth with 67.[114] On the evidence of survivals, Bede's most widely copied book of Biblical exegesis was his *Commentary on the Catholic Epistles* with 114 manuscripts, well short of the *Ecclesiastical History* and *The Reckoning of Time*. The twelfth century appears to be the high-water mark in the popularity of Bede's works; after that time there is a marked decline in the numbers of copies that were made of many of them.[115] If we confine our attention to the first five centuries (eighth–twelfth), an even more remarkable pattern emerges. *The Reckoning of Time* leads the list with 130 manuscripts. *On the Nature of Things* is second with 95.5.[116] The *Ecclesiastical History* drops to third with 92. And

111 Wallis, *The Reckoning of Time*, p. 3.

112 In the MSS, *The Reckoning of Time* (*De temporum ratione*) is often entitled *Liber de temporibus maior* to distinguish it from its predecessor *On Times* (*Liber de temporibus*).

113 Westgard, 'Bede and the Continent in the Carolingian Age and Beyond', pp. 206–11, and table 1.

114 Westgard excludes epitomes and extracts, which accounts for the difference between his figures for *ONT* and *OT* and ours.

115 A notable exception is Bede's textbook, *The Art of Poetry and Rhetoric*, which seems to have fallen out of favour in the twelfth century but otherwise continued to be copied at a steady rate right up to the Renaissance.

116 Westgard, p. 210, explains that '[c]omposite manuscripts with parts originating in

On Times rises to tenth with 62. That is, for the first five centuries after their composition, up to and including the century when copying of his works was at its peak, Bede's textbooks on time and on natural history were in greater demand than anything else he wrote (always with the caveat that the accidents of survival and in particular the loss and destruction of manuscripts in the Anglo-Saxon period in England have inevitably distorted the picture that we see).

Insular manuscripts of these texts are both comparatively few (less than one in ten) and almost entirely post-Conquest, and in most cases can be shown to derive from French exemplars[117] – clear evidence that English monastic libraries were obliged to re-import them from abroad to make up for the attrition caused by the wear and tear of constant use as well as the destruction wrought by the Viking invasions of the previous centuries.[118] In all, thirteen Insular manuscripts of *On the Nature of Things* (*DNR*, nos. 7, 19, 21, 23, 43–46, 69, 71–72, 75, and 105) and nine or ten of *On Times* (*DT*, nos. 29 [?], 30, 32–33, 37, 39, 51–53, and 55) survive.[119] The only potential witness to the survival of a pre-Viking age manuscript of either text in England is the text of *On Times* in Oxford, St John's College 17 (*DNR*, no. 75/*DT*, no. 55).[120]

We have already noted that *On the Nature of Things* is immediately followed in surviving manuscripts by *On Times* 56 times; the reverse order

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different centuries and those dated around the turn of a century have been divided equally between the centuries in question'. Hence, the fractional number.

117 Jones, CCSL 123A, 184 (referring specifically to *DNR*).

118 Beeson, 'The Manuscripts of Bede', p. 73.

119 Manuscripts held in British libraries are as likely to be Continental in origin as Insular; in the absence of some stated provenance they cannot be assumed to be Insular, and are not so-counted. Manuscripts in Continental libraries on the other hand are almost certainly Continental, even if nothing more is known of their origins.

120 St John's 17 was written entirely at Thorney Abbey, between 1102 and 1110. However, the text traditions of *ONT* and *OT* in that manuscript are different. Both *ONT* and *De temporum ratione* in St John's 17 are related to the French family of texts associated with Abbo of Fleury. St John's 17's text of *OT*, on the other hand, belongs to a more archaic recension, most exemplars of which hail from southern Germany and Switzerland. These Continental manuscripts ultimately depend on Karlsruhe 167 (s. ix^{1}) (our *DNR*, no. 36/*DT*, no. 22) or its exemplar, which may have come directly from the British Isles. St John's 17's exemplar may have migrated back to Britain from Germany, for its text is in close agreement with both Karlsruhe 167 and its putative twin, St Gall 250; however, it is also possible that it came from an ancient English codex which never left the islands, and which somehow survived the depredations of the Viking years. *DNR*, no. 43, and *DT*, nos. 30 and 37, each contain a single chapter only, and may never have been part of complete texts.

On Times/*On the Nature of Things* occurs only three times.[121] The attrition of *On Times* that we mentioned above, caused by *The Reckoning of Time*, is significant, though not overwhelming. Apparently Bede's reputation was enough to insure that *On Times* was not necessarily neglected even when *The Reckoning of Time* was available. The two works on time often travel together. Of the 59 manuscripts with *ONT* and *OT* in either order, 45 also carry *The Reckoning of Time*. Still, *The Reckoning of Time* is found with *On the Nature of Things* in 22 manuscripts that lack *On Times*.[122]

It is instructive to compare the provenance of manuscripts of the eighth and ninth centuries with those of the eleventh and twelfth centuries. In the eighth and ninth centuries we can discern a dissemination of manuscripts from England across the North Sea in a broad arc across northern France and the Lowlands and then bending toward the south into Burgundy and the Rhineland, Bavaria, and Switzerland and on into northern Italy. In the broad band of the arc are the great abbeys and ecclesiastical centres of the Carolingian Empire – St-Amand, Corbie, St-Quentin, Metz, Trier, Cologne, Mainz, Lorsch. On the outer periphery along the fringes of the Empire are the abbeys founded, in some cases, by Irish and Anglo-Saxon missionaries – Corvey, Fulda, St Emmeram's (Regensburg), Reichenau, St Gall and Einsiedeln. A lesser stream may be noticed in north-central France, flowing across the Channel into Normandy and Brittany and then inland up the Seine and the Loire – Jumièges, St-Germain, and Auxerre; St-Aubin (Angers), Tours, Fleury, and Nevers. Based on 11 variants, which he analysed in 37 manuscripts, Jones postulates two distinct recensions of *On Times*, both of which may have originated in Northumbria (though the earliest exemplars are Continental). One can be traced as far back as a manuscript from north-eastern France, Karlsruhe 167 (our *DT*, no. 22), which is perhaps at one remove from the British Isles. Apparently directly descended from it are four St-Gall manuscripts from the ninth and tenth centuries (our *DT*, nos. 77–78, 106, 110), two eleventh-century manuscripts from Italy and Bavaria (our *DT*, nos. 43, 48) and a single twelfth-century English manuscript from Thorney (our *DT*, no. 55). The other recension survives in French manuscripts of the ninth through the eleventh centuries (our *DT*, nos. 5, 21, 35, 50, 56, 63, 90). Then in the twelfth century and after, French manuscripts of this recension apparently provide the exemplars for most of the copies made in England (our *DT*, nos. 32–33, 39, 51). The remaining manuscripts that Jones

121 Above, p. 5.

122 Two of these manuscripts, however, include the shorter chronicle from *On Times*.

examined comprise a third 'mixed' recension.[123]

Copying of manuscripts of *On the Nature of Things* and *On Times* went on all over western Europe in the eleventh and twelfth centuries from Ripoll in the Spanish Pyrenees to Melk on the Danube in eastern Austria, from Tortona in the Po Valley to the Abbaye de Lyre in Normandy. There is very little overlap with the provenance of eighth- and ninth-century manuscripts and no pronounced geographical lines of distribution. In some cases copying can be explained by the need of new foundations to build up their collections (Cîteaux, Prüfening, St Michael's of Hildesheim); in others the motivation for copying may have been more a matter of filling gaps and replacing worn-out or destroyed codices (Winchcombe, Malmesbury, Thorney). But whatever the immediate impetus, the overall picture remains clear – Bede's works on nature and time were and remained authoritative texts everywhere in western Europe right through the twelfth century.

Nor did they disappear from view after that time, although demand for them fell off. They continued to be copied at a slower rate right up to the age of printing. Seven printed editions of *On the Nature of Things* and of *On Times* (two without the shorter chronicle) appeared between the sixteenth and the twentieth centuries; two editions of the shorter chronicle alone, in the nineteenth and twentieth centuries.

THE RECEPTION OF *ONT* AND *OT*: GLOSSES AND EXCERPTS

The principal immediate zone of reception of *On the Nature of Things* and *On Times* was Carolingian Europe. The impact of the two texts, and particularly of *ONT*, peaked in the ninth century. It can be traced not only through the production of manuscripts, but through two complementary activities of processing and assimilating these texts for teaching and study: glossing and excerpting. Excerpting digests a text by selecting elements deemed particularly useful or pertinent, while glossing amplifies the impact of a text not only by explaining it, but also by linking it to other contexts, such as religious symbolism. In both cases, *ONT* proved to be a more successful and valued text than *OT.* In its glossed form it garnered additional attention and prestige by being yoked to Bede's highly successful *De temporum ratione.* Some of the more important gloss families, such as the Laon-Metz glosses preserved in Berlin, Staatsbibliothek, Phillipps 1832 (our *DNR*, no. 10/*DT*, no. 6), cover both works, and in Hervagius's 1563 printed edition,

123 Jones, *BOT*, pp. 161–64.

glosses once belonging to *ONT* were borrowed to fill in cognate sections of *De temporum ratione.* Nonetheless, the glossing tradition of *ONT* follows a different trajectory than does that of *De temporum ratione.*

The first, and to date still the fullest and most useful overview of the *ONT* glosses produced in the Carolingian period is the 1961 Yale doctoral dissertation of Frances Randall Lipp, 'The Carolingian Commentaries on Bede's *De natura rerum*'. Lipp identified four principal families of glosses dispersed through manuscripts and (in the case of the 'B glosses' (i.e., the glosses by Byrhtferth of Ramsey and the 'Incerti auctoris glossae') Hervagius's 1563 edition of Bede and its later reprintings. Each of these families illustrates a distinctive approach to Bede's text.

The FG group is represented by Vatican City, B.A.V., Reg. lat. 1260 (Lipp's MS F; our *DNR*, no. 125), s. ix, Fleury, and Paris, B.N. nouv. acq. lat. 1615 (Lipp's MS G; our *DNR*, no. 95), s. ix, Auxerre or Fleury. The goal of the FG glosses is to clarify: they are overwhelmingly interlinear lexical and syntactic explanations. In addition, both codices contain 'graphic glosses', such as a wind rose to supplement chapter 10. The Vatican codex also includes a diagram showing the relative positions of the sun, the moon and earth during a solar and a lunar eclipse; and Paris contains a schematic map. Moreover, some of the Tironian glosses in Paris seem to refer to other illustrations not included in this copy. Bede's policy of banishing illustrations from his re-working of Isidore's *DNR* was evidently reversed by his glossators; furthermore, the Tironian glosses indicate that the FG glosses were drawing on a more extensive commentary.

This is also the pattern exhibited by Lipp's AC family, better known as the Laon-Metz glosses. In Jones's *Corpus christianorum* edition of *On the Nature of Things*, Lipp's edition of the glosses from Berlin, Staatsbibliothek, Phillipps 1832, ca. 873 (Lipp's MS A; our *DNR*, no. 10), appears as a separate apparatus. John J. Contreni has established that this manuscript was without question written in Laon, though it later resided in Metz. The hand of Laon's famous *scholasticus* Martin the Irishman can be seen in corrections to the text and glosses of *On the Nature of Things*. However, unlike the *DTR* glosses in this codex, the glosses of *On the Nature of Things* were not composed at Laon, but selectively copied from a pre-existing source.[124]

The Laon commentary on *ONT*, unlike the FG family, aims to expand and expound on Bede's text. It is very ample – half again as long as the text itself – and 'very nearly constitutes a treatise on cosmology and astronomy

124 Contreni, 'Bede's Scientific Works', pp. 249–51; Contreni, *The Cathedral School of Laon*, pp. 124–26; Lipp, 'The Carolingian Commentaries', pp. 49–50.

in its own right'.[125] The commentator was an able scholar and a dedicated teacher who liked to construct glosses in question-and-answer format. He expended considerable effort to fill the gaps in Bede's often brief and general statements, adding information from sources unknown to Bede, such as Martianus and Macrobius, and indicating where Bede and these authorities differed. He also showed a predilection for explanations that rationalize the workings of nature – for example, he disagrees with Bede that we are obliged to take the 'waters above the firmament' literally (*ONT* 8). Lipp concludes that he was strongly influenced by John Scottus Eriugena, and possibly associated with a centre like Reims, Laon or Auxerre.[126] He wrote in a straightforward and accessible manner, assuming little background knowledge on the part of his student readers. This glossator's work was incorporated almost in its entirely into Byrhtferth's glosses (see below), and was used extensively by the two other manuscripts, Amiens 222 (Lipp's MS Ca; our *DNR*, no. 3), s. ix, northeastern France, and Paris, B.N. nouv. acq. lat. 1632 (Lipp's MS Cp; our *DNR*, no. 96) s. ix, Fleury. Moreover, both these two manuscripts and Byrhtferth appear to have borrowed from the Laon glosses via intermediaries, which suggests that the Laon glosses were quite widely diffused.[127]

The HI group comprises Milan, Ambrosiana D 48 inf. (Lipp's MS H; our *DNR*, no. 60), s. xi, Tortona, and Vatican City, B.A.V., Vat. lat. 644 (Lipp's MS I; our *DNR*, no. 130) s. x, St. Gall. The Milan version of the glosses was probably composed in the later ninth or early tenth century; Lipp argues that it represents a selection from the vastly longer St Gall recension. These glosses also aim to expand Bede's text: however, the level of scientific knowledge is much lower than in the Laon glosses, and there is a marked tendency to dilate on religious and moral observations. The HI glosses were exploited heavily by a fourth family, which Lipp calls B, and which survive only in printed form. The B commentaries comprise the Byrhtferth glosses[128] printed in Hervagius's 1563 edition of Bede's works, plus the glosses Hervagius

125 Lipp, 'The Carolingian Commentaries', p. 46.

126 Lipp, 'The Carolingian Commentaries', pp. 78–79.

127 Lipp, 'The Carolingian Commentaries', pp. 46–47.

128 Hervagius ascribed these glosses to the English computist Byrhtferth of Ramsey, who flourished in the final decades of the tenth century and the early years of the eleventh. Byrhtferth's authorship of the glosses was challenged by Jones, 'The Byrhtferth Glosses', because large portions of the glosses could be found in ninth-century glosses. The issue is currently in dispute. Gorman, 'The Glosses on Bede's *De temporum ratione*', and Lapidge, 'Byrhtferth of Ramsey', argue in favour of Byrhtferth's authorship; Contreni, 'Bede's Scientific Works', and personal communication, against.

called *Incerti auctoris glossae*.[129] The former were allegedly composed by the English computist, historian and hagiographer Byrhtferth of Ramsey (fl. ca. 986–ca. 1020), and so are post-Carolingian, but they illustrate the diffusion and creative adaptation of the Carolingian glossing tradition. They are also of considerable intrinsic interest, and will be referred to frequently in the notes and commentary of this translation. The Byrhtferth glosses on *ONT* comprise not only the glosses accompanying this text (which we refer to as BDNR) but also some that were transposed into the glosses on *De temporum ratione* (BDTR).[130] While the Byrhtferth glosses on *De temporum ratione* seem closely connected to Heiric and Remigius of Auxerre, the *ONT* glosses compile materials from the earlier independent traditions enumerated above: the Laon glosses, the FG group (especially in the form found in the Paris manuscript) and the St Gall branch of the HI family, with its strong interest in religious, and to some degree computistical themes.[131] The *Incerti auctoris glossae* also exhibit this pronounced religious orientation, usually by appending an allegorical interpretation to a natural explanation.

There are in addition at least four significant commentaries on *ONT* which lie outside any affiliation. These are the glosses in Tironian notes in Melk 412 (our *DNR*, no. 59) by Heiric of Auxerre, the Latin and Old Irish glosses in Karlsruhe 167 (our *DNR*, no. 36),[132] the glosses in Paris, B.N. lat. 5543 (our *DNR*, no. 83; AD 847, Fleury), largely confined to the first ten chapters of Bede's text, and the Old Breton glosses in Angers 477 (our *DNR*, no. 5).

From their ninth-century high-water mark of eight manuscripts, glossed codices of *ONT* drop off steeply in number. There is a slight revival in the eleventh century (three manuscripts) and in the twelfth century, notably in England, but nothing thereafter. On the other hand, re-cycling *ONT* in the form of extracts was a much more sustained activity. While there is evidence that *ONT* was exploited by authors of particular Carolingian texts, notably

129 Hervagius also prints a *Vetus commentarius* and *scholia*, which he took over from Noviomagus's edition. The *Vetus commentarius* comes from a MS associated with Abbo of Fleury (p. 192, n. 7 – see van de Vyver, 'Les oeuvres inédits d'Abbon de Fleury', p. 150 sq.). Noviomagus divided it up to serve as a commentary on *DNR* and on parts of *DTR* and *DT*. The *Incerti auctoris glossae* gloss the prefatory verses and all or part of 15 chapters.

130 For a list of these displaced glosses, see Lipp, 'The Carolingian Commentaries', pp. 199–200.

131 Lipp, 'The Carolingian Commentaries', pp. 195, 205–6; Contreni, 'Bede's Scientific Writings', p. 258.

132 Published by Stokes and John Strachan, *Thesaurus Paleohibernicus* 2, 10–13; analysed by Killion, 'Bede's Irish Legacy', pp. 125–41.

the astronomical text known as *Aratus latinus*,[133] it was the encyclopaedic compilations of cosmology, astronomy and *computus* that set the fashion for excerpting Bede.

The creation of integrated anthologies of *computus* lore was one of the signal achievements of the Carolingian period and later.[134] These anthologies were characterised by the arrangement of excerpts from different sources into new structures, formally organized into books and chapters (though these were not always 'canonized' and were subject to constant re-working and revision).[135] Bede's scientific writings were heavily mined for these productions, but in terms of the two texts under consideration here, *ONT* was much more prominent than *OT.* The absorption of *ONT in toto* into the seven-book 'Aachen Computus Encyclopaedia of 809' (where it forms the first part of book 7) signals an interest in expanding *computus* to encompass more and more astronomical and cosmological content.[136] More commonly, however, individual chapters of *ONT* were lifted out of their original context and inserted into fresh compilations of cosmography and *computus*. For example, Vatican City, B.A.V. Vat. lat. 5530 (AD 896; our *DNR*, no. 132) contains chapters 1–3 of *ONT* excerpted into a computistical compilation of 180 chapters.

The trend continued well into the eleventh and twelfth centuries. In Vatican City, B.A.V., Reg. lat. 123 (A.D. 1056: our *DNR*, no. 121), Abbot Oliva of Ripoll, perhaps inspired by Carolingian models, created an encyclopaedia of *computus*, cosmology and astronomy in four books, using *DTR* interlarded with chapters of *ONT*, as well as extracts from Hyginus, Isidore, Pliny and others.[137] Oxford, Bodleian Library, Canon lat. 560 (s. xi), fols. 4v–24 (our *DNR*, no. 70), pulls apart the text of *ONT* and in some cases abbreviates it, assembling it in a very different order. Chapters on the universe as a whole and the upper heavens (1–9) are succeeded by sections on lightning (ch. 19), eclipses (chs. 22–23), weather signs (ch. 36), and the stars, celestial zones, zodiac, moon and planets (chs. 11, 10, 16, 20, 12–13, 15, 14). The realm of air (ch. 15) is joined to the chapters on meteorological phenomena (chs. 28–35, 37). By contrast, only two chapters about earth are included, one of the sphericity of the planet (ch. 46) and a second on earthquakes.

133 King, 'An unreported early use of Bede's *De natura rerum*'.

134 Borst, *Schriften*, pp. 146 *sqq*.

135 Borst, *Schriften*, pp. 182–86.

136 Borst, *Schriften*, pp. 1054–86, 1321–22; Borst, 'Alcuin und die Enzyklopädie von 809'.

137 For a detailed survey of the contents of this manuscript, see Puigvert, 'El manuscrito Vat. reg. Lat. 123'.

These are followed by five chapters on waters (38, 40–43). A twelfth-century English codex, Baltimore, Walters Art Gallery 73 (our *DNR*, no. 7), made a more restricted selection of chapters from *ONT*, filling in with extracts from Bede's sources, Isidore and Pliny (a not unusual practice).[138] Quite the opposite approach was adopted by the compilers of Paris, B.N. lat. 7418 (our *DNR*, no. 87): in this case, *ONT* was 'exploded' into a 98-chapter augmented version by interleaving additional material from Isidore's *Etymologies*. In sum, to a significant degree *ONT* was transmitted in partial or modified form through extracts and re-arrangements. Indeed, of all Bede's works, *ONT* seems to have been the one most subjected to this kind of re-processing.

PRINCIPLES GOVERNING THIS TRANSLATION

These are the first English translations of Bede's *On the Nature of Things* and *On Times* to appear in print. For our translation of *On the Nature of Things* (*De natura rerum*), we used the text edited by Charles W. Jones in CCSL 123A, 189–234. For *On Times* (*De temporibus*), chs. 1–16, we used the text prepared by Jones in his *Bedae opera de temporibus*, pp. 293–303, and for *On Times*, chs. 17–22, the edition of Theodore Mommsen, published in *Chronica minora* 3 (MGH: AA 13), 223–354; these two texts have been reprinted without change in CCSL 123C, 579–611. Throughout, we have consulted the printed editions of Giles and Migne and the on-line reproductions of St-Gall MSS 248 and 251. All our departures in translation from the printed texts of Jones and Mommsen are signalled with supporting evidence in the notes. Page references to the CCSL editions are inserted in **bold** between virgules for the convenience of readers who wish to consult the original Latin. For the most part, we have followed the principles and procedures enunciated by each of us separately in our previous translations in the Liverpool University Press series 'Translated Texts for Historians'.[139] Our aim has been to render Bede's text as faithfully as possible while conforming to the conventions of modern English word order and style. Technical terms that have no precise English equivalent (e.g., *bes*, *computus*, *momentum*, *punctus*) are retained in their Latin form with explanations as appropriate. Unlike the prose in his historical works and biblical commentaries, Bede's Latin in these treatises is sometimes

138 Bober, 'An Illustrated Medieval School-Book'.

139 See Wallis, *Bede: The Reckoning of Time*, pp. xcix–ci; Kendall, *Bede: On Genesis*, pp. 53–57.

elliptical (though rarely to the point of obscurity).[140] In such cases we typically expand silently to avoid as much as possible the use of intrusive square brackets. Jones and Mommsen thoroughly investigated Bede's sources, and we have needed to make only a few corrections and additions to their identification of *verbatim* borrowings. We follow Jones's practice of italicizing such quotations. However, the value of his other findings with respect to possible sources and parallels varies considerably, and of these we have made only limited and selective use.

INVENTORY OF MANUSCRIPTS AND EDITIONS OF BEDE'S *ONT* AND *OT*

Our inventory is intended to gather together and collate information about the manuscripts and editions of Bede's *On the Nature of Things* and *On Times* that is at present scattered and in part out of date.[141] Sources consulted include: Beeson, 'The Manuscripts of Bede'; Bischoff, *Katalog*; Borst, *Schriften*; Gameson, *Manuscripts*; Gneuss, *Handlist*; HMML; Jones, CCSL 123A, 174–84 [*DNR*], and CCSL 123C, 580–83 [*DT*]; Jones, 'MSS of Bede's *DNR*'; Jones, *BP*, pp. 111–40; Jones, *BOT*, pp. 161–67; Jones, CCSL 123B, 242–56; *Jordanus*; Laistner, *Hand-List*, pp. 139–48; Lowe, CLA; *Medieval Manuscripts in Dutch Collections*; Mommsen, *CM* 3 (MGH: AA 13), 223–354; Mostert, *The Library of Fleury*; *Rep. Chron.*; Stevens, Appendix I; and information supplied by Joshua Westgard. Manuscript depositories are cited in the form given in Kristeller, *Latin Manuscript Books before 1600.*

For each MS we indicate whether it contains any or all of Bede's related writings, including *De temporum ratione* (*DTR*). *DNR* = *De natura rerum*; *DT* = *De temporibus*; *DT* chronicle = the *chronica minora* of *DT* alone. The writings are listed in the order they appear in the MSS. A virgule (/) between items means they follow each other consecutively in the MS (e.g., *DNR*/*DT*); a plus sign (+) indicates that a gap of more than one page separates the two (e.g., *DTR* + *DT*). Where the order is unknown to us, only the additional item is listed, with the plus sign (e.g., + *DTR*). Manuscripts personally examined by Faith Wallis are indicated by an asterisk.

140 On Bede's style in these early treatises, see the perceptive remarks of Richard Sharpe, 'The Varieties of Bede's Prose', esp. pp. 352–53.

141 For the purposes of this inventory, we find it convenient to refer to Bede's works by the initials of their Latin titles: *DNR* (*De natura rerum*) = *On the Nature of Things*; *DT* (*De temporibus*) = *On Times*; *DTR* (*De temporum ratione*) = *The Reckoning of Time*.

Sigla from the editions of Jones and Mommsen are added in **bold** for MSS to which we make reference in our textual notes. In addition, we have examined the on-line ('e-codices, Virtual Manuscript Library of Switzerland' <http://www.e-codices.unifr.ch>) reproductions of St Gall 248 and 251. For Bede's *On the Nature of Things*, the *sigla* are:

A (Jones), Melk 412
C (Jones), Amiens 222
G (Jones, also Kendall/Wallis), St Gall 251
L (Jones), Vatican, Pal. lat. 1449
M (Jones), Berlin 130
N (Jones), Paris, B.N., N.a.l. 1615
Sg (Kendall/Wallis), St Gall 248
S^{v} (Jones), Vienna, Nationalbibliothek 387

For Bede's *On Times*, chs. 1–16, they are:

B (Jones), Berlin 128
K (Jones), Karlsruhe, Aug. perg. 167
O (Jones), Oxford, Bodl. Libr., Auct. F 3 14
S (Jones), St Gall 250
Sg (Kendall/Wallis), St Gall 248
Z (Jones), Oxford, St John's College 17

For Bede's *On Times*, chs. 17–22, they are:

E (Mommsen), Einsiedeln 167
F (Mommsen), Berlin 128
H (Mommsen, also Kendall/Wallis), St Gall 251
M (Mommsen), Paris, B.N. 4860
P (Mommsen), Vatican, Pal. lat. 1448
Sg (Kendall/Wallis), St Gall 248

MANUSCRIPTS OF BEDE'S *DE NATURA RERUM*

1. ABERYSTWYTH, National Library of Wales Peniarth 540, two bifolia, s. xii^{1}. Chs. 27–48. Stevens, App. 1, p. 678.
2. ADMONT, Stiftsbibliothek 111, s. xi. + *DTR*.
3. AMIENS, Bibliothèque Communale de la Ville 222, fols. 19–27, s. ix$^{3/3}$, northeastern France. 'Versus Bedae presbiteri'. Quatrain and *capitula*. Heavy glosses. Jones, 'MSS of Bede's *DNR*', 431; Bischoff, *Katalog*, no. 36. *DT* (incomplete; see below) + *DTR* + *DNR*. (**C**, Jones)

4. ANGERS, Bibliothèque municipale 476 (460), fols. 59^{v}–66, s. ix^{2}, Brittany (Redon?); provenance St-Aubin. Jones, CCSL 123A, 174; Bischoff, *Katalog*, no. 67. *DTR* + *DNR*.

5. ANGERS, Bibliothèque municipale 477 (461), fols. 10–18^{v}, 897, Brittany (Léon); provenance St-Aubin. With glosses, some in Breton vernacular. See Lambert, 'Les gloses en vieux-breton aux écrits scientifiques de Bède'. Bischoff, *Katalog*, no. 69. *DNR*/*DT* + *DTR*.

6. AUSTIN, University of Texas, Harry Ransom Humanities Research Center, Phillipps 816, fols. 2^{v}–11^{v}, s. xi, Niederaltaich, scribe: Abbot Ellinger of Tegernsee (ca. 975–1056). 'Incipit excerptum Bedae De naturali historia Plinii'. With glosses. Jones, CCSL 123A, 175, 177.

7. BALTIMORE, Walters Art Gallery 73, fols. 1–9^{v}, s. xii, English. Excerpts, incorporated into a compilation on cosmology and *computus*, from or based on *DTR* chs. 24, 12 and 2, and from the following chs. of *DNR*: 16, 17, 19, 12, 11, 20, 22, 24, 25, 18, 23, 39, with *figurae*. Jones, CCSL 123A, 175. Bober, 'Illustrated Medieval Schoolbook'. *DNR* (extracts) + *DTR* (extracts)?

*8. BAMBERG, Staatsbibliothek**,** Patr. 101 (B V 19), fols. 86–100^{v}, s. ix/x, central Italy; provenance Bamberg, Dombibliothek. With glosses. Bischoff, *Katalog*, no. 236. *DNR*/*DT*.

9. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Phillipps 1831 (Rose 128), fols. 91–99^{v}, s. ix in., Verona; provenance Metz. 'Versus baeda presbiteri'. Quatrain. 'Capitula libri de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 431. Bischoff, *Katalog*, no. 437. *DTR* + *DNR*/*DT.*

10. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Phillipps 1832 (Rose 130), fols. 1–9, ca. AD 873, Laon; provenance Metz (see Contreni, 'Bede's Scientific Works', pp. 249–51). Quatrain, 'De natura rerum capitula haec sunt'. 'De quadrifario dei opere ex opusculis augustini episcopi'. Heavy glosses. Jones, 'MSS of Bede's *DNR*', p. 431; Bischoff, *Katalog*, no. 436; *DNR*/*DT DTR*. (**M**, Jones)

11. BERN, Burgerbibliothek 285, fols. 99^{v}–108^{v}, s. xii, Fleury? 'Versus bede presbiteri. in libro dae [*sic*] natura rerum'. Quatrain. No *capitula*. Chs. not numbered. Jones, 'MSS of Bede's *DNR*', p. 431; not listed in Mostert, *The Library of Fleury*. *DNR*/*DT*.

*12. BERN, Burgerbibliothek 610, fols. 52^{v}–69^{v}, s. ix$^{3/3}$, vicinity of Tours. No quatrain; no *capitula*. Chapters are numbered consecutively 14–65 (= *DNR*, chs. 1–51, with a discrepancy of one chapter), following chs. 1–13 only of *DT*. Bischoff, *Katalog*, no. 609; Mostert, *The Library of Fleury*, p. 81 (BF221). *DT*/*DNR* + *DTR*.

13. BESANÇON, Bibliothèque municipale 186, fols. 26–32, s. ix$^{3/3}$, eastern France (?). Incomplete; begins with ch. 8, and many pages illegible or torn. Bischoff, *Katalog*, no. 627. *DNR* + *DTR*.
14. BORDEAUX, Bibliothèque municipale 11, fols. 198^{v}–213, s. xii, La Sauve. Jones, CCSL 123A, 175; chs. 1 and 2 only?, Laistner, p. 140. But, according to Jones, CCSL 123B, 244, fols. 198^{v}–213 are *DTR*. Unconfirmed; possibly extracts only. + *DTR*.
15. BRUSSELS, Bibliothèque Royale Albert Ier 9728–9734, fol. 197^{v}, s. xiii, Ste-Rictrude de Marchiennes. Quatrain and list of *capitula* to xxxvii only. Jones, CCSL 123A, 175. *DNR* quatrain and *capitula* + *DT capitula*.
16. BRUSSELS, Bibliothèque Royale Albert Ier 9837–9840 [1361], fols. 1^{v}–8, s. xii, St Amand. 'Item versus eiusdem bedae de sequenti opere'. Quatrain. 'Incipiunt capitula in libro de temporibus edito a venerabili beda presbitero'. *Capitula*. 'Incipit liber venerabilis Bedae presbiteri. de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 431. *DNR*/*DT* + *DTR*.
17. BRUSSELS, Bibliothèque Royale Albert Ier 9932–9934 [1359], fols. 1^{v}–12, s. xi, St Laurent, Liège. 'Versus Bedae Presbiteri'. Quatrain and *capitula*. Source attributions in titles. 'Explicit liber de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 431. *DNR*/*DT* + *DTR*.
18. CAMBRAI, Bibliothèque municipale 249, fols. 2–8^{v}, s. xii, St Sépulcre.
19. CAMBRIDGE, Library of Corpus Christi College 359, fols. 73^{v}–74, s. xiv^{1}, English. No *capitula*. Ends in ch. 15.

*20. CAMBRIDGE, Library of Trinity College O. 8. 6 (1381), fols. 1–10^{v}, s. xii.

21. CAMBRIDGE, University Library Ff I 27, p. 116, s. xiii, English. Quatrain only. Jones, CCSL 123A, 175. *DTR* + *DNR*.
22. CAMBRIDGE, University Library Gg II 21, fols. 190–200, s. xii/xiii. *DT* Chronicle/*DNR*.
23. CAMBRIDGE, University Library Ii I 32, fols. 203–11, s. xiv, Norwich.
24. CARPENTRAS, Bibliothèque Inguimbertine 1792, s. xv–xvii. Chapter 12 and some other extracts only. Laistner, p. 140; omitted without comment by Jones, CCSL 123A, 176.
25. CAVA DE' TIRRENI, Archivio e Biblioteca della Badia della SS. Trinità 3, fols. 137–50, 192–208^{v}, s. xi. Scattered excerpts. Jones, CCSL 123A, 176; HMML no. Italy Cava de' Tirreni Biblioteca della SS. Trinità. Codex Cavensis 3. *DTR* + *DNR*.

*26. COLOGNE, Dombibliothek 103, fols. 23^{v}–35, s. viii/ix, written for Hildebald, Archbishop of Cologne, 785–819. The basis for the edition

of Noviomagus. Jones, 'MSS of Bede's *DNR*', p. 431; Lowe, CLA 8, 39 (no. 1158); Bischoff, *Katalog*, no. 1916. *DNR*/*DT* + *DTR*.

27. DIJON, Bibliothèque municipale 77, fol. 209^{v}, s. xii, Cîteaux. Quatrain only. Jones, CCSL 123A, 176.
28. DIJON, Bibliothèque municipale 448, fol. 25^{v} (ch. 12, extract), fols. 201–203^{v} + fols. 173–176, s. x (Jones, CCSL 123A, 176); s. x and xii (Laistner, p. 140), St-Bénigne. Some gatherings of the MS have been disarrayed. Fols. 196–203 actually belong between folio 172 and 173. *DTR* fols. 108–172 + fols. 196–200; *DT* fols. 176–181. Jeudy and Riou, *Les manuscrits classiques latins*, 1, 483–500. Fol. 201: 'Incipiunt duo libelli de natura rerum et ratione temporum Bede presbiteri'. *DTR*/*DNR*/*DT*.
29. ESCORIAL, Real Biblioteca de San Lorenzo de El Escorial L I 3, AD 1047?, fol. 233^{v}–238^{V}. Excerpts. Laistner, p. 140 (Laistner gives the shelf number as 'Q I 3'); Jones, CCSL 123A, 176.
30. ESCORIAL, Real Biblioteca de San Lorenzo de El Escorial R III 9, fol. 120^{v}, s. xii^{2}.
31. FLORENCE, Biblioteca Medicea Laurenziana XXIX 24, fols. 63–69^{v}, s. xi. + *DT.*
32. FLORENCE, Biblioteca Riccardiana, Cod. 379, fols. 1–19, s. xiii^{1}. *Jordanus*.
33. FREIBURG IM BREISGAU, Erzbishöfliches Archiv Hs. 35, ix$^{3/4}$, Lotharingia (vicinity of Prüm). Bischoff, *Katalog*, no. 1279.
34. GENEVA, Bibliothèque Publique et Universitaire 50, fols. 24–32, s. ix$^{1/4}$, Massay. 'Fol. 24, containing the quatrain, *capitula*, and odd computistical statements, is in a definitely later hand. Fol. 25 begins Ch. 1 without rubrics' (Jones, *BP*, p. 117). Jones, 'MSS of Bede's *DNR*', p. 431; Bischoff, *Katalog*, no. 1351. *DNR*/*DT* + *DTR*.
35. GRAZ, Universitätsbibliothek 297 (39/9f.), fols. 1–9^{v}, s. xii. HMML no. 26209. *DNR*/*DTR*.
36. KARLSRUHE, Badische Landesbibliothek, Aug. perg. 167, fols. 18–20^{v} (Jones CCSL 123A, 176: fols. 18–23^{v}; but see Jones, CCSL 123B, 246; CCSL 123C, 580 [no. 75]), AD 848, northeastern France (Soissons?). No incipit. Quatrain. Irish glosses; source-marks. Jones, 'MSS of Bede's *DNR*', p. 431; Bischoff, *Katalog*, no. 1676. *DNR*/*DT*/*DTR*.
37. KARLSRUHE, Badische Landesbibliothek, Karlsruhe 442, fols. 21^{v}–27^{v}, s. ix$^{2/4}$, western Germany. 'Incipit liber de natura rerum'. Laistner, p. 141; Jones, CCSL 123A, 176; Bischoff, *Katalog*, no.1782; *Jordanus*. + *DT* (?).

38. KLOSTERNEUBURG, Stiftsbibliothek 685, fols. 1^{v}–8^{v}, s. xii. Historiated initial O of Bede dressed as a monk. HMML no. 5666. *DNR*/*DT*/*DTR*.
39. LEIDEN, Universiteitsbibliotheek, Voss. Lat. Q 57, fols. 128^{v}–136, s. xv^{mid}. *Medieval Manuscripts in Dutch Collections*. *DNR*/*DT*.
40. LEIDEN, Universiteitsbibliotheek, Voss. Lat. Q 75, fols. 118^{v}–127, s. ix^{2}, eastern France. Bischoff, *Katalog*, no. 2226; *Medieval Manuscripts in Dutch Collections*.
41. LONDON, British Library, Additional 34749 (Phillipps 1056), fol. 3–14, s. xii^{2}. One folio missing; begins in ch. 2.

*42. LONDON, B.L., Cotton Caligula A XV, fol. 71, s. viii^{2}, northeastern France. Copied from an exemplar written AD 743. Ch. 17 only, as part of the 'Computus Cottonianus', the core of which was composed in Spain in the seventh century: see Cordoliani, 'Textes de comput espagnol du VIIe siècle: le Computus Cottonianus', and Gómez Pallarès. Jones, CCSL 123A, 176; Lowe, *CLA* 2, 19 (no. 183).

43. LONDON, B.L., Cotton Domitian I, fol. 2, s. x^{2}. Ch. 2. Gneuss, *Handlist*, no. 326.

*44. LONDON, B.L., Cotton Tiberius E IV, fols. 125-131^{v}, s. xii$^{1\text{-}2/4}$, Winchcombe. Complete but burned. Marginal glosses and diagrams. Gameson, *Manuscripts*, no. 409. *DTR*/*DNR*/*DT* (excerpts only of *DT*).

45. LONDON, B.L., Cotton Vespasian B XIII, fols. 22^{v}–26^{v}, s. xiii?, English.

*46. LONDON, B.L., Egerton 3088 (Beatty 59, Phillipps 12200), fols. 68^{v}–76^{v}, c. 1243**,** Dore Abbey. 'Versus Bede in librum de natura rerum quem ex libris plinii secundi. excerpsit'. Quatrain. Source-marks. Jones, 'MSS of Bede's *DNR*', pp. 432–33. *DTR*/*DNR*/*DT*.

47. LONDON, B.L., Harley 3091, fols. 6–12, s. ix$^{2/3}$, Nevers (?). 'Incipiunt versus bedae prbi'. Quatrain. 'Incipit liber bedae presbiteri de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 433; Bischoff, *Katalog*, no. 2476. *DNR*/*DT* + *DTR*.
48. LONDON, B.L., Harley 3105, fols. 90–99, s. xii. Laistner, 141; Jones, CCSL 123A, 177 ('Harley 3015').
49. LONDON, B.L., Harley 3735, fols. 3^{v}–5, s. xiv. 'Crammed (together with Bede's *DT*, foll. 5r–5v) on flyleaves of the original codex (95 lines per column)'. Jones, CCSL 123A, 177. *DNR*/*DT*.

*50. LONDON, B.L., Royal 13 A XI, fols. 14–22, s. xii^{in}, Normandy or NW France (Gneuss, *Handlist*). 'Incipiunt duo libelli bede presbiteri de natura rerum et ratione temporum. Incipit liber primus de quadri-

fario dei opere'. Source-marks. Jones, 'MSS of Bede's *DNR*', p. 433; Gameson, *Manuscripts*, no. 548. *DNR*/*DT* + *DTR*.

51. LONDON, B.L., Sloane 2030, fols. 3–9, s. xii/xiii.
52. LONDON, Quaritch *Catalogue No. 833* (1962), No. 1, s. xii. Jones, CCSL 123A, 177. Present location unknown.
53. LONGLEAT, Collection of the Marquess of Bath, 117, pt. 1, fols. 2v–8v, s. xiii, St Augustine's, Canterbury. 'Catalogus codicum manuscriptorum in Bibliotheca Nobilissimi viri Johannis Alexandri Thynne Marchionis Bathiae apud Longleate in Comitatu Wiltoniae Asservatorum' (handwritten catalogue of 1864), pp. 89–90.
54. LUCCA, Biblioteca Capitolare Feliniana 490, fols. 310–31 (Laistner, p. 141); fols. 310–21 (Jones, CCSL 123A, 177), ca. 800, Lucca. Lowe, *CLA* 3, 10 (no. 303e); Bischoff, *Katalog*, no. 2524.
55. LYON, Bibliothèque de la Ville 45, fols. 149–56, s. xiv and xvi, Adamoli.
56. MADRID, Biblioteca Nacional 19 (A 16), fols. 114–34, s. xii, Ripoll. 'Incipit liber venerabilis Bede presbyteri de naturis rerum de quadrifario opere dei'. Laistner, p. 141; Jones, CCSL 123A, 177; *Jordanus*. *DTR* + *DNR*.
57. MADRID, Biblioteca Nacional 3307, fol. 72, s. ix^{1}, Metz. An important manuscript of the 'Aachen Encyclopaedia of 809' (discussed above p. 41); Book 7 contained all of *DNR*, but due to the loss of some leaves only chapters 47–51 remain: Borst, *Schriften*, pp. 248–49 and 1321–22. Jones, CCSL 123A, 177. *DTR* + *DNR*.
58. MELK, Stiftsbibliothek 348 (382, G 48), pp. 1–17, s. xii. HMML no. 1355. *DNR*/*DT*/*DTR*.
59. MELK, Stiftsbibliothek 412 (370, G 32), pp. 1–16, s. ix$^{1/4}$, Auxerre. Glosses in Tironian notes**,** by Heiric of Auxerre. Jones, *BP*, p. 123; Bischoff, *Katalog*, no. 2739; HMML no. 1957. *DNR*/*DT* + *DTR*. (**A**, Jones)
60. MILAN, Biblioteca Ambrosiana D 48 Inf., fols. 57–66, AD 1018, from Tortona. 'Incipiunt capitula libri primi de natura rerum'. *Capitula*; no quatrain. Sources in chapter-titles. Glosses. *DTR*/*DNR*/*DT*.
61. MONZA, Biblioteca Capitolare f 9/176, fols. 83–92^{v}, s. ix$^{3/4}$, western Germany. Jones, CCSL 123A, 178; Bischoff, *Katalog*, no. 2892.
62. MUNICH, Bayerische Staatsbibliothek CLM 175, fols. 1–8^{v}, s. xv. Pages lost after rubric for ch. 43.

*63. MUNICH, Bayerische Staatsbibliothek CLM 210, fols. 129^{v}–145, AD 818, upper Austria. Quatrain; no *incipit*. Jones, 'MSS of Bede's *DNR*, p. 433; Bischoff, *Katalog*, no. 2923. *DNR* + *DTR*.

64. MUNICH, Bayerische Staatsbibliothek CLM 4355, fols. 6–16^{v}, s. xv, from Augsburg. *DTR*/*DNR*.
65. MUNICH, Bayerische Staatsbibliothek CLM 17145, fols. 57–66^{v}, s. xii, Scheftlarn. Laistner, p. 142; Jones, CCSL 123A, 178; *Jordanus*.

*66. MUNICH, Bayerische Staatsbibliothek CLM 21557, fols. 84–93^{v}, s. xi, Weihenstephan. 'Incipit Liber Bedae Presbiteri De Naturis Rerum'. *Capitula* and quatrain. Jones, 'MSS of Bede's *DNR*', p. 433. *DTR*/*DNR*/*DT*.

67. NEW HAVEN, Yale University Medical Library 25, fols. 73^{v}–74, ca. 1450, Germany. Ch. 25 only. *Jordanus*; Faye and Bond, *Supplement to the Census of Medieval and Renaissance Manuscripts*, p. 59.
68. ORLÉANS, Bibliothèque municipale 31 (28), pp. 221–29, s. ix med., Loire vicinity; provenance Fleury. 'Incipiunt versus bedae presbiteri'. Quatrain. 'Incipiunt capitula I. bedae presbiteri de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 433; Bischoff, *Katalog*, no. 3660; Mostert, *The Library of Fleury*, p. 116 (BF442). *DNR*/*DT* + *DTR*.

*69. OXFORD, Bodleian Library, Auct. F. 3.14 (Western 2372), fols. 20–27^{v}, s. xii^{1} (pre 1125), Malmesbury. Quatrain and *capitula*. 'Explicit liber bedae venerabilis presbiteri de natura rerum'. Source-marks in margin. Jones, 'MSS of Bede's *DNR*', p. 433; Gameson, *Manuscripts*, no. 626. *DNR*/*DT* + *DTR*.

70. OXFORD, Bodleian Library, Canon. lat. 560, fols. 4^{v}–24, s. xi. 'An assemblage containing part or all of *DNR* chapters in this order: 1–9, 19, 22–23, 36, 11, 10, 16, 20, 12–13, 15, 14, 25, 28–35, 37, 46, 49, 38, 40–43'. Jones, CCSL 123A, 178.

*71. OXFORD, Bodleian Library, Digby 63, fols. 33^{v}–34^{v}, s. ix^{2} (?), Winchester. 'Some paraphrases of *DNR*, but only a sentence or two copied'. Jones, CCSL 123A, 178; not listed in Bischoff, *Katalog*. *DTR* (ch. 1) + *DNR* + *DTR* (ch. 19).

72. OXFORD, Bodleian Library, e Museo 223, fols. 153–161, s. xiii, St Augustine's, Canterbury. 'Bedae excerpta ex plinio de imagine mundi et temporum'. Through ch. 49. Very corrupt. Jones, 'MSS of Bede's *DNR*', p. 433.
73. OXFORD, Lincoln College 96, fols. 127^{v}–132, s. xiii.
74. OXFORD, Magdalen College 183, fols. 1–11, s. xv. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 433. *DNR*/*DT*/*DTR*.

*75. OXFORD, St John's College 17, fols. 62–65, ca. 1092–1110**,** Thorney. Starts at ch. 16. Interlinear and marginal glosses. 'Explicit de natura rerum liber'. A few glosses. See Wallis, 'The Calendar and the Cloister',

and n. 120, above. Jones, ‘MSS of Bede’s *DNR*’, p. 433; Gameson, *Manuscripts*, no. 794. *DT* + *DNR*/*DTR*.

76. PARIS, Bibliothèque Mazarine 175, fol. 160^{v}, s. xii, St Victor. Excerpt only. + *DTR*.
77. PARIS, Bibliothèque nationale lat. 446, fols. 198–202^{v}, s. xii–xiii, Bonport. Ends with ch. 49.
78. PARIS, B.N. lat. 1956, fols. 76–81, s. xii^{2}.
79. PARIS, B.N. lat. 2340, s. xi. Lost. *DNR*/*DT*/*DTR*?
80. PARIS, B.N. lat. 3563, s. xiv. Jones, CCSL 123A, 179.
81. PARIS, B.N. lat. 4860, fols. 108–111^{v}, s. ix^{2}, Bodensee (Reichenau?). ‘Incipit Liber Bedae presbiteri de naturis rerum versus eiusdem’. Quatrain and *capitula.* Jones, ‘MSS of Bede’s *DNR*’, p. 433. *DTR*/*DT* chronicle + *DNR*.

*82. PARIS, B.N. lat. 5239, fols. 24–32, s. x, St Martial, Limoges. Quatrain. ‘Incipit liber bedae presbiteri de natura rerum’. *Capitula*. Jones, ‘MSS of Bede’s *DNR*’, p. 434; Jones, *BP*, p. 128; Jones, CCSL 123A, 179 (mis-numbered ‘B.N. 5329’). *DNR*/*DT* + *DTR*.

*83. PARIS, B.N. lat. 5543, fols. 76^{v}–85, AD 847, Fleury. ‘Incipiunt Versus Bedae presbiteri’. Quatrain. ‘Incipit Liber Bedae presbiteri de natura rerum’. *Capitula*. Glosses. Jones, ‘MSS of Bede’s *DNR*’, p. 434; Mostert, *The Library of Fleury*, pp. 207–8 (BF1058). *DTR*/*DNR*/*DT*.

*84. PARIS, B.N. lat. 7299A, fols. 66^{v}–70, s. xii, southwest France, possibly Limoges. Ends in ch. 24. Borst, *Schriften*, pp. 272–73. *DNR* + *DTR*.

85. PARIS, B.N. lat. 7361, fol. 42^{v}, s. xi, Germany, perhaps Lower Rhine. ‘Versus Bedae Presbiteri’. Quatrain only. Jones, ‘MSS of Bede’s *DNR*’, p. 434; Borst, *Schriften*, pp. 273–74. *DNR* quatrain/*DT* chronicle.
86. PARIS, B.N. lat. 7400B, fols. 12–27, s. $ix^{3/4}$, France; provenance Fleury?. Mostert, *The Library of Fleury*, p. 216 (BF1104). *DNR*/*DT*.
87. PARIS, B.N. lat. 7418, fols. 123–137^{v}, s. xiv. 98 chapters; mixed with materials from Isidore, *Etym*., etc. *DTR* + *DNR*.
88. PARIS, B.N. lat. 7887, s. ix^{ex}, provenance Fleury? ‘This is called 7581 in Laistner’s list’ (Jones, CCSL 123A, 180); Paris, *Cat*. III, 4, 410; Mostert, *The Library of Fleury*, p. 220 (BF1128).
89. PARIS, B.N. lat. 11130, fols. 69^{v}–81^{v}, s. xii. Quatrain and *capitula*. Many *rotae* and *figurae*. Jones, ‘MSS of Bede’s *DNR*’, p. 434.
90. PARIS, B.N. lat. 13013, fols. 30–37, ca. 830, Auxerre. *DNR* and *DT* joined without quatrain, *capitula*, or rubrics. *DNR*/*DT* + *DTR*.

*91. PARIS, B.N. lat. 14088, fols. 50–59, s. ix, France? Garbled *capitula* and rubrics. Beeson, p. 79; Mostert, *The Library of Fleury*, p. 235. *DTR* + *DNR*/*DT*.

92. PARIS, B.N. lat. 15685, fols. 1–10, s. ix, belonged to Sorbonne. 'Incipiunt versus bedae presbiteri'. Quatrain. 'Incipit liber bedae presbiteri de natura rerum'. *Capitula*. Jones, 'MSS of Bede's *DNR*', p. 434. *DNR/DT*.

*93. PARIS, B.N. lat. 16361, pp. 1–18, s. xii, belonged to Sorbonne. 'Versus Bedae'. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 434. *DNR/DT + DTR*.

94. PARIS, B.N., Nouv. acq. lat. 1612 (Libri 87), fols. 1–7, s. ix, Tours. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 434. *DNR/DTR*.

*95. PARIS, B.N., Nouv. acq. lat. 1615 (Libri 90), fols. 128ᵛ–135, s. ix, Auxerre or Fleury?; provenance Fleury. 'Versus Bedae Presbiteri'. Quatrain, *capitula*, glosses using Tironian notes. Jones, 'MSS of Bede's *DNR*', p. 434; Mostert, *The Library of Fleury*, p. 243 (BF1258). *DTR + DNR/DT*. (**N**, Jones)

96. PARIS, B.N., Nouv. acq. lat. 1632 (Libri 41), fols. 1–9, s. ix, Fleury?; provenance Fleury. 'Versus Bede presbiteri'. Quatrain, *capitula*, extensive glosses. Jones, 'MSS of Bede's *DNR*', p. 434; Mostert, *The Library of Fleury*, p. 247 (BF1277).

97. POMMERSFELDEN, Gräflich Schönbornsche Bibliothek 53, fols. 1ᵛ–13ᵛ, s. xii. *DNR/DT + DTR*.

98. ROUEN, Bibliothèque municipale A292 [26], fols. 164–173ᵛ, s. ix, Jumièges. 'Versus bedae presbyteri'. Quatrain. 'Capitula libri de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 434. *DNR/DT*.

99. ROUEN, Bibliothèque municipale U74 [1177], fols. 282ᵛ–288ᵛ, s. xii, Jumièges. 'Explicit libellus bede presbiteri de natura rerum quem secundam maiorem partem descripsit de libro plinii secundi naturali hystoriae'. *DT/DNR + DT*.

100. ST GALL, Stiftsbibliothek 248, pp. 83–92, s. ix, St Gall or northern France. No *incipit*. Quatrain. Source-marks. 'Finit liber primus [*DNR*] incipit secundus [*DT*]'. Copy of Karlsruhe, B. L., Aug. perg. 167 (see *DT*, St Gall, 248, below)? Jones, 'MSS of Bede's *DNR*', p. 434; Borst, *Schriften*, p. 288. *DNR/DT + DTR*. (**Sg**, Kendall/Wallis)

*101. ST GALL, Stiftsbibliothek 250, pp. 121–45, ca. 889, St Gall. 'Versus Bedae presbiteri'. Quatrain. 'Explicit liber de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 434. *DTR* (excerpts) + *DNR/DT/DTR*.

102. ST GALL, Stiftsbibliothek 251, pp. 33–44, before 820, St Gall. 'Versus Betae [*sic*] presbiteri'. Quatrain. 'Inc. de naturis rerum'. Source-marks in margin. Jones, 'MSS of Bede's *DNR*', p. 435. *DT* chronicle + *DNR/DTR*. (**G**, Jones, also Kendall/Wallis)

103. ST GALL, Stiftsbibliothek 397, pp. 123–40, s. ix^2, St Gall. Quatrain.

'Explicit liber de naturis rerum'. Scattered chapters of *DTR* before *DNR*; only ch. 4 is contiguous with *DNR*. Jones, 'MSS of Bede's *DNR*', p. 435. *DTR* (extracts)/*DNR*.

104. ST GALL, Stiftsbibliothek 878, pp. 242–62, AD 827–829, Fulda? Part of a vade mecum prepared by Walafrid Strabo at Fulda before he became abbot of Reichenau: Bischoff, 'Eine Sammelhandschrift Walahfrid Strabos', pp. 39–40. *DNR*/*DT*.
105. SAN MARINO, Henry E. Huntington Library and Art Gallery, HM 1345, s. xiv, fols. 40–46ᵛ, English. 'Incipiunt excepta que beda ex libris plinii secundi de naturis rerum excepit'. Somewhat garbled *capitula* and rubrics.
106. SCHAFFHAUSEN, Stadtbibliothek 61, fols. 1–9, s. x. 'Versus Bedae Presbyteri'. Quatrain and *capitula*. 'Explicit liber de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 435. *DNR*/*DT* + *DTR*.
    Stonyhurst College, see WHALLEY.
107. STRASBOURG, Bibliothèque municipale 326, fols. 1–10ᵛ, s. x, Angoulème or Limoges? *DNR*/*DT*/*DTR*.
108. STRASBOURG, Bibliothèque du Grand Séminaire, fragment of four fols. Munster (Alsace). Jones, CCSL 123A, 182.
109. STUTTGART, Württembergische Landesbibliothek, Theol. Q 172, fols. 1–7ᵛ, s. xii, Chomberg. 'Incipit liber bede presbiteri de natura rerum'. Quatrain. Jones, 'MSS of Bede's *DNR*', p. 435. *DNR*/*DTR*.
110. TRIER, Bistumsarchiv 6, fols. 58–65, s. xi/xii, from St Michael's Abbey, Hildesheim. HMML no. 40372.
111. TRIER, Stadtbibliothek/Stadtarchiv 2500, fols. 142ᵛ–149, s. ix, St Maximin's, Trier. Franz and Lehnart, *Karolingische Beda-Handschrift aus St. Maximin* (Westgard); Laistner's Munich, 'untraced', p. 144; formerly Koblenz, Görrische Bibliothek 16; see also Jones *BOT*, p. 160. *DNR*/*DT*/*DTR*.
112. UTRECHT, Bibliotheek der Rijksuniversiteit 73, fols. 95–109ᵛ, AD 1462, Carthusians near Utrecht.
113. VALENCIA, Biblioteca de la Catedral 93 (240?). Jones, CCSL 123A, 182.
114. VALENCIA, Biblioteca Universitaria 46, s. xv. Laistner, p. 143; *Jordanus*; 'Biblioteca de Valencia. Catálogo de los códices procedentes del monasterio de San Miguel de los reyes', *Revista de Archivos, Bibliotecas y Museos* V (1875) 13. Omitted without comment by Jones, CCSL 123A, 182.
115. VALENCIENNES, Bibliothèque municipale 174, fols. 1ᵛ–13ᵛ, s. ix,

St Amand. 'Incipiunt versus bedae presbiteri'. Quatrain and *capitula*. 'Incipit liber de natura rerum'. Heavily glossed. Jones, 'MSS of Bede's *DNR*', p. 435. *DTR* + *DNR*/*DT* + *DTR*.

116. VALENCIENNES, Bibliothèque municipale 343, fols. 14–22v, s. x, St Amand. 'Incipit capitula libri bedae de natura rerum ex opusculis sancti augustini'. *Capitula*. Glosses. 'Explicit liber bedae de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 435. *DT*/*DNR* + *DTR*.
117. VATICAN CITY, Biblioteca Apostolica Vaticana, Barberini lat. 477, fols. 72v–88, s. xi. *Capitula* and quatrain. Jones, 'MSS of Bede's *DNR*', p. 435. *DNR*/*DT*.
118. VATICAN CITY, B.A.V., Ottobon. lat. 6, fols. 15–18v, s. xii. Begins in ch. 20. 'Finit liber Baede de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 435. *DNR*/*DT*/*DTR* (ch. 4 only).
119. VATICAN CITY, B.A.V., Pal. lat. 317, fols. 111–114v, s. xiv. 'Beda de naturis rerum'. *Capitula* and quatrain. Jones, 'MSS of Bede's *DNR*', p. 435.
120. VATICAN CITY, B.A.V., Pal. lat. 1449, fols. 105–112v, s. ix, Mainz or Lorsch. Quatrain and *capitula*. 'Explicit liber de natura rerum'. Jones, 'MSS of Bede's *DNR*', p. 435; Borst, *Schriften*, p. 300. *DTR* (chs. 1–65)/*DNR*/*DT* + *DTR* (chs. 66–71). (**L**, Jones)

*121. VATICAN CITY, B.A.V., Regin. lat. 123, fols. 127–219v, AD 1056, Ripoll; prepared by Abbot Oliva. Most of *DNR* in scattered chapters intermingled with chapters from *DTR*. This is an encyclopaedic treatment of *computus*, cosmology and astronomy organized in four books, and composed of excerpts from Bede, Isidore, Hyginus, Pliny and others: see García Avilés, *El tiempo y los astros*, ch. 78; and Puigvert, 'El manuscrito Vat. reg. lat. 123 y su posibile adscripción al scriptorium de Santa María de Ripoll'. (*DTR* + *DT*(?) + *DNR*).

*122. VATICAN CITY, B.A.V., Regin. lat. 309, fols. 107v–117, s. x, St Denis. 'Versus Baedae Praesbiteri'. Quatrain. 'Capitula libri De naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 435. *DTR* + *DNR*.

123. VATICAN CITY, B.A.V., Regin. lat. 755, fols. 88–92v, s. x, St-Columba, Sens (Jones), St-Trinité of Fécamp or St-Berthe of Blangy. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 435; Mostert, *The Library of Fleury*, p. 276 (BF1463). *DTR*/*DNR*/*DT*.
124. VATICAN CITY, B.A.V., Regin. lat. 1038, fols. 129–135v, s. x. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 435. *DTR*/*DNR*/*DT*.
125. VATICAN CITY, B.A.V., Regin. lat. 1260, fols. 1–7v, s. ix, Fleury. 'Incipit liber Baedae Presbiteri. De natura rerum'. Quatrain. Heavy

glosses. Jones, 'MSS of Bede's *DNR*', p. 435; Mostert, *The Library of Fleury*, p. 279 (BF1482). *DNR*/*DT*.

126. VATICAN CITY, B.A.V., Regin. lat. 1405, fols. 56–84, s. xi. 'Versus Bedae presbiteri'. *Capitula* and quatrain. 'Explicit liber Bedae Presbiteri de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 435. *DNR*/*DT*.

*127. VATICAN CITY, B.A.V., Rossi lat. 247, fols. 8–19v, AD 1018?, St-Chaffre du Monastier. *Capitula*, quatrain, and glosses. Jones, 'MSS of Bede's *DNR*', p. 435; Borst, *Schriften*, p. 308. *DNR*/*DT* + *DTR*.

128. *VATICAN CITY, B.A.V., Vat. lat. 642, fols. 1–6v, s. xi, from Lyon. 'Incipit liber bede presbiteri de natura rerum'. *Capitula* and quatrain. Jones, 'MSS of Bede's *DNR*', p. 436. *DNR*/*DT* + *DTR*.

129. *VATICAN CITY, B.A.V., Vat. lat. 643, fols. 1–9, s. xii, Melk? *Capitula* and quatrain. Jones, 'MSS of Bede's *DNR*', p. 436. *DNR*/*DT*/*DTR*.

130. *VATICAN CITY, B.A.V., Vat. lat. 644, fols. 1v–6v, s. x, St Gall. Lost gatherings; text from chs. 9–47. Heaviest marginal glosses of any *DNR* MS; several times the length of the text. *DNR*/*DT* + *DTR*.

131. *VATICAN CITY, B.A.V., Vat. lat. 645, fols. 81v–92v, s. ix, most likely St-Quentin. Quatrain and *capitula*. Jones, 'MSS of Bede's *DNR*', p. 436; Borst, *Schriften*, pp. 311–12. *DTR* + *DNR*.

132. *VATICAN CITY, B.A.V., Vat. lat. 5530, fols. 3–4, AD 896. *DNR*, chs. 1–3, excerpted into a computistical compilation of 180 chapters. Jones, CCSL 123A, 183.

133. VERCELLI, Archivio Capitolare 138, pp. 69–96, s. x. 'Bede de Naturis rerum liber I'. Jones, CCSL 123A, 183.

134. VIENNA, Österreichische Nationalbibliothek 387, fols. 130v–156v, s. ix, Salzburg. *Jordanus*; HMML no. 17564. *DTR* + *DNR*. (**S**v, Jones)

135. VIENNA, Österreichische Nationalbibliothek 522, fols. 3–29, s. x, Salzburg. HMML no. 13852. *DNR* + *DTR*.

136. VIENNA, Österreichische Nationalbibliothek 12600, fols. 97–105, s. xii/xiii, from Prüfening.

137. WHALLEY, Stonyhurst College 26, fols. 2–10v, s. xii2–xiii in., written in England. Ker, *Medieval Manuscripts in British Libraries* 4, 396 (2).

138. WOLFENBÜTTEL, Herzog August Bibliothek, Helmst. 696, fol. 62v, s. xv. Excerpts.

139. WOLFENBÜTTEL, Herzog August Bibliothek, Weiss. 66, fols. 54–61v, s. ix/x, eastern France?

140. YORK, Minster Library 42. 'V. Beda de naturis rerum ex Plinio'. Jones, CCSL 123A, 184.

141. ZÜRICH, Zentralbibliothek C 62, fols. 224v–232v, s. x, St Gall.

Quatrain. Jones, 'MSS of Bede's *DNR*', p. 436. *DNR*/*DT*.

142. ZÜRICH, Zentralbibliothek Car C 176, fols. 188–202^{v}, s. x/xi. St Gall. No quatrain; *figurae*. *DTR* is said to be fols. 174–231^{v} (Jones, CCSL 123B, 255). Jones, 'MSS of Bede's *DNR*', p. 436. *DT*/*DNR* inserted into *DTR*?
143. ZWETTL, Zisterzienserstift 296, fols. 3–12^{v}, s. xii/xiii. HMML no. 6889. *DNR*/*DT*/*DTR*.

MANUSCRIPTS OF BEDE'S *DE TEMPORIBUS*

Manuscripts of chs. 16/17–22 of *De temporibus* (= the *Chronica minora*) alone, are preceded by a dagger (†).

1. ANGERS, Bibliothèque municipale 477 (461), fols. 18–22, AD 897, Brittany (Leon); provenance St-Aubin. Ends with ch. 15. Jones, CCSL 123C, 580 (no. 5); Bischoff, *Katalog*, no. 69. *DNR*/*DT* + *DTR*.
2. AVRANCHES, Bibliothèque municipale 135, fols. 120–121, s. xii/xiii. Fragment. Jones, CCSL 123C, 582 (Avranches, '155'); Stevens, App. 1, p. 678; cf. Jones, CCSL 123B, 243 (Avranches, 135).
3. BAMBERG, Staatsbibliothek, Patr. 101 (B V 19), fols. 100^{v}–111, s. ix/x, central Italy; provenance Bamberg Dombibliothek. Bischoff, *Katalog*, no. 236. *DNR*/*DT*.

†4. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Lat. fol. 307, s. xiii. First three ages only. Mommsen, 3, 241; Jones, *BOT*, p. 167; *Rep. Chron*. Omitted without comment by Jones, CCSL 123C, 580–83.

5. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Phillipps 1831 (Rose 128), fols. 100–106, s. ix in., Verona; provenance Metz. 'Incipit liber Bedae de temporibus'. Mommsen, *CM* 3, 231; 241; Jones, *BOT*, pp. 163–64; Bischoff, *Katalog*, no. 437. *DTR* + *DNR*/*DT*. (**B**, Jones; **F**, Mommsen)
6. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Phillipps 1832 (Rose 130), fols. 9^{v}–14^{v}, ca. AD 873, Laon; provenance Metz (see Contreni, 'Bede's Scientific Works', pp. 249–51). 'Incipiunt capitula libri secundi de temporibus'. Mommsen, *CM* 3, 231; 241; Jones, *BOT*, p. 164; Bischoff, Katalog, no. 436, *DNR*/*DT* + *DTR*.

†7. BERLIN, Staatsbibliothek zu Berlin, Preussischer Kulturbesitz, Lat. 956, fols. 5^{v}–8, s. xii, from Havelberg; written in France. Chs. 16–22. Jones, CCSL 123C, 582.

8. BERN, Burgerbibliothek 285, fols. 109–112, s. xii, Fleury? Ends ch. 13 with a spurious ch. 14. ‘Incipit ii’ de ratione temperum [*sic*]’. Jones, *BOT*, p. 165; not listed in Mostert, *The Library of Fleury*. *DNR*/*DT*.

*9. BERN, Burgerbibliothek 610, fols. 47^{v}–52^{v}, s. ix$^{3/3}$, vicinity of Tours. Chs. 1–13 only. Chs. 14–65 are really *DNR*. ‘Incipit liber ii de temporibus et momentis’. Jones, *BOT*, p. 165; Bischoff, *Katalog*, no. 609; Mostert, *The Library of Fleury*, p. 81 (BF221). *DT*/*DNR* + *DTR*.

10. BRUSSELS, Bibliothèque Royale Albert Ier 9728-9734, fol. 197^{v}, s. xiii, Ste-Rictrude de Marchiennes. Jones, CCSL 123C, 582. *DNR* quatrain and *capitula* + *DT capitula*.

11. BRUSSELS, Bibliothèque Royale Albert Ier 9837-9840 [1361], fols. 8^{v}–13^{v}, s. xii/xiii, St-Amand. ‘Incipit liber de temporibus i’. Mommsen, *CM* 3, 233; 241; Jones, *BOT*, p. 165. *DNR*/*DT* + *DTR*.

12. BRUSSELS, Bibliothèque Royale Albert Ier 9932-9934 [1359], fols. 12–18^{v}, s. xi, St Laurent, Liège. ‘Incipit liber secundus de temporibus’. Mommsen, *CM* 3, 241; Jones, *BOT*, p. 165. *DNR*/*DT* + *DTR*.

13. CAMBRIDGE, Library of Trinity College, B. 3. 5 (84), fols. 144–144^{v}, s. xi^{ex}, Canterbury, Christ Church. Extract. Gameson, *Manuscripts*, no. 140.

†14. CAMBRIDGE, University Library Gg II 21 [not Gg II 31, as in Mommsen and Jones], pp. 183–89, s. xiii. ‘Libellus Bedae presbiteri temporibus minor’. Excerpts. Mommsen, *CM* 3, 241. *DT* Chronicle/*DNR*.

*15. COLOGNE, Dombibliothek 103, fols. 35–43^{v}, s. viii/ix, Cologne, written for Hildebald, bishop of Cologne, 785—819. ‘Incipit liber secundus de temporibus’. Mommsen, *CM* 3, 234; 241; Jones, *BOT*, p. 164; Lowe, *CLA* 8, 39 (no. 1158); Bischoff, *Katalog*, no. 1916. *DNR*/*DT* + *DTR*.

16. DIJON, Bibliothèque municipale 448, fols. 176–181, s. xi (Jones, CCSL 123B, 245); s. x and xii (Laistner, p. 148), St-Bénigne. Jones, CCSL 123C, 580 (no. 54). See *DNR*, no. 28. *DTR*/*DNR*/*DT*.

17. DURHAM, Cathedral Library, Hunter 100, s. xii^{in}, Durham. Delete from list: see below, p. 65.

†18. EINSIEDELN, Stiftsbibliothek 167, fols. 387–390, s. x. ‘De sex aetatibus mundi’. Mommsen, *CM* 3, 241; Jones, CCSL 123C, 582. (**E**, Mommsen)

†19. FLORENCE, Biblioteca Medicea Laurenziana, Ashburnham 1554, fol. 75, s. xi. Ch. 22 only. Mommsen, *CM* 3, 241.

20. FLORENCE, Biblioteca Medicea Laurenziana XXIX 24, s. xi. Borst, *Schriften*, pp. 229–30. + *DNR*.

21. GENEVA, Bibliothèque Publique et Universitaire 50, fols. 32–37^{v}, s.

ix$^{1/4}$ (in a later hand than bulk of MS which is ca. 804), Massay. ‘Incipit liber de temporibus’. Jones, *BOT*, p. 164; Bischoff, *Katalog*, no. 1351. *DNR*/*DT* + *DTR*.

22. KARLSRUHE, Badische Landesbibliothek, Aug. perg. 167, fols. 21–23, AD 848, northeastern France (Soissons?). Bischoff, *Katalog*, no. 1676. *DNR*/*DT*/*DTR*. (**K**, Jones)
23. KARLSRUHE, Badische Landesbibliothek, Karlsruhe 442, s. x–xi. Laistner, p. 145 and p. 141; Jones, *BOT*, p. 167; Bischoff, *Katalog*, no. 1782. + *DNR*.
24. KLOSTERNEUBURG, Stiftsbibliothek 685, fols. 8^{v}–14, s. xii. HMML no. 5666. *DNR*/*DT*/*DTR*.
25. LEIDEN, Universiteitsbibliotheek, Scaliger 44, fol. 87–87^{v}, s. xv. Excerpt. *Medieval Manuscripts in Dutch Collections*.

†26. LEIDEN, Universiteitsbibliotheek, Voss. Lat. Q 12:4, fols. 73–73^{v}, s. x. Excerpt. *Medieval Manuscripts in Dutch Collections*.

27. LEIDEN, Universiteitsbibliotheek, Voss. Lat. Q 57, fols. 136– 139^{v}, s. xv^{mid}. *Medieval Manuscripts in Dutch Collections*. *DNR*/*DT*.
28. LONDON, British Library, Additional 22635, fols. 51–52, s. xiv. Chs. 15, 17–22. Jones, *BOT*, p. 165. *DTR*/*DT*.
29. LONDON, B.L., Additional 36591, fol. 40, s. xv (William Langley, 1476). Fragment from a binding. Jones, CCSL 123C, 582.

*30. LONDON, B.L., Cotton Tiberius B V, s. xi, Christ Church, Canterbury? Winchester? (prov. Battle). Ch. 14. Gneuss, *Handlist* no. 373. + *DTR*.

*31. LONDON, B.L., Cotton Tiberius C I, fol. 2^{v}, s. xii$^{1-2/4}$ (between 1122 and 1135?), Peterborough. Excerpt ch. 11. Jones, CCSL 123C, 581 (no. 89); Gameson, *Manuscripts*, no. 404.

*32. LONDON, B.L., Cotton Tiberius E IV, fols. 131^{v}–135, s. xii$^{1-2/4}$, Winchcombe. Excerpts. Jones, *BOT*, p. 165; CCSL 123C, 581 (no. 90); Gameson, *Manuscripts*, no. 409. *DTR*/*DNR*/*DT*.

*33. LONDON, B.L., Egerton 3088 (Beatty 59, Phillipps 12200), fols. 76^{v}–79^{v}, ca. AD 1243, Dore Abbey. Ch. 14 split into separate chapters; ch. 15 with rubric ‘De ratione et misterio pasche’. ‘Incipit eiusdem (Bedae) liber de temporibus’. Jones, *BOT*, p. 165. *DTR*/*DNR*/*DT*.

*34. LONDON, B.L., Harley 3017, fols. 168^{v}–172^{v}, s. ix$^{3/4}$, France. Chs. 1–11 and 13, with an omission in ch. 3, because part of ch. 3 and ch. 12 are found elsewhere in codex (Jones, *BOT*, p. 165); fols. 143–190^{v}: ‘Excerpts intermingled with the text of *DTR*’ (Jones, CCSL 123C, 581 [no. 94]). Bischoff, *Katalog*, no. 2466; Mostert, *The Library of Fleury*, p. 107 (BF382). + *DTR*.

35. LONDON, B.L., Harley 3091, fols. 12[v]–16[v], s. ix[2/3], Nevers (?). 'Incipit liber ii de temporibus'. Mommsen, *CM* 3, 235; 241; Jones, *BOT*, p. 165; Bischoff, *Katalog*, no. 2476. *DNR*/*DT* + *DTR*.
36. LONDON, B.L., Harley 3735, fols. 5[r-v], s. xiv. Chs. 1–16 only. Jones, *BOT*, p. 165. *DNR*/*DT*.
†37. LONDON, B.L., Royal 2 B V, s. x/xi. Ch. 16. Gneuss, *Handlist* no. 451.
38. LONDON, B.L., Royal 12 F II, s. xii. *Rep. Chron.*; see Jones, CCSL 123B, 247.
*39. LONDON, B.L., Royal 13 A XI, fols. 22–28, s. xii[in], English or French. 'Incipit ii' de temporibus horis et momentis'. After ch. 15: 'Explicit liber bede presbiteri de temporibus secundus de mundi aetatibus'. Mommsen, *CM* 3, 234; 241; Jones, *BOT*, p. 165; Gameson, *Manuscripts*, no. 548. *DNR*/*DT* + *DTR*.
40. LUCCA, Biblioteca Statale, 2297, s. xv. *Rep. Chron*.
41. MELK, Stiftsbibliothek 348 (382, G 48), pp. 17–30, s. xii. World diagram at p. 30 (end of *DT*). Jones, *BOT*, p. 167; HMML no. 1355. *DNR*/*DT*/*DTR*.
42. MELK, Stiftsbibliothek 412 (370, G 32), pp. 16–26, s. ix[1/4], Auxerre. Jones, *BP*, p. 123; CCSL 123C, 581 (no. 110); Bischoff, *Katalog*, no. 2739; HMML no. 1957. *DNR*/*DT* + *DTR*.
43. MILAN, Biblioteca Ambrosiana D 48 Inf., fols. 66–72, AD 1018, San Marziano of Tortona. Glosses. 'Incipit liber secundus de temporibus'. 'Explicit liber de temporibus Bede presbiteri feliciter'. Mommsen, *CM* 3, 241. *DTR*/*DNR*/*DT*.
44. MILAN, Biblioteca Ambrosiana M 12 Sup., pp. 3–12, ca. 866, written partly in Lobbes, partly in Herford. Palimpsest in Tironian notes. Jones, *BOT*, p. 165; Bischoff, *Katalog*, no. 2645. *DT* + *DTR*.
45. MUNICH, Bayerische Staatsbibliothek CLM 4423, pp. 158[v]–164, s. xv. Jones, *BOT*, p. 167; Laistner, p. 146; Jones, CCSL 123C, 581, no. 125; but see Jones, CCSL 123B, 249, no. 125, where he states that *DTR* is found on pp. 157–64. + *DTR*.
†46. MUNICH, Bayerische Staatsbibliothek CLM 14746, fols. 91–98, s. ix[1], Regensburg St Emmeram. Mommsen, *CM* 3, 241; Bischoff, *Katalog*, no. 3258.
†47. MUNICH, Bayerische Staatsbibliothek CLM 18628, s. x, Tegernsee. Mommsen, *CM* 3, 241.
*48. MUNICH, Bayerische Staatsbibliothek CLM 21557, fols. 93[v]–99, s. xi, Weihenstephan. 'Incipit liber ii de temporibus'. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 166. *DTR*/*DNR*/*DT*.

49. NAPLES, Biblioteca Nazionale Vittorio Emanuele II V A 13, fols. 45–48, s. ix$^{3/4}$, Corbie. Chs. 1–11. Bischoff, *Katalog*, no. 3575; Stevens, App. 1, p. 678.

50. ORLÉANS, Bibliothèque municipale 31 (28), pp. 229–35, s. ix med., Loire vicinity; provenance Fleury. 'Incipit liber de temporibus'. Jones, *BOT*, p. 166; Bischoff, *Katalog*, no. 3660; Mostert, *The Library of Fleury*, p. 116 (BF442). *DNR*/*DT* + *DTR*.

*51. OXFORD, Bodleian Library, Auct. F.3.14 (Western 2372), fols. 27^{v}–33, s. xii^{1} (pre 1125), Malmesbury. Mommsen, *CM* 3, 235; 242; Gameson, *Manuscripts*, no. 626. *DNR*/*DT* + *DTR*. (**O**, Jones)

52. OXFORD, Bodleian Library, Auct. F infra 1.2 (Western 1926), fols. 189–191^{v}, s. xiv, Reading. 'Incipit liber bede de temporibus primus'. Jones, *BOT*, p. 166. *DT* + *DTR*.

*53. OXFORD, Bodleian Library, Digby 56, fol. 192^{v}, s. xii, west England. Ch. 15 only. *DTR*/*DT*.

54. OXFORD, Magdalen College 183, fol. 11, s. xv. 'Incipiunt capitula libri secundi de temporibus', with list of chapters but no text; *DTR* begins on same folio. Jones, *BOT*, p. 166. *DNR*/*DT*/*DTR*.

*55. OXFORD, St John's College 17, fols. 58^{v}–61^{v}, AD 1109–10, Thorney. 'A poor text, but nearest to Hervagius' manuscript, which was copied in all editions since *saec*. xvi'. Jones, *BOT*, p. 165. 'Incipiunt capitula super librum minorem bedae presbiteri de temporibus'. Gameson, *Manuscripts*, no. 794. *DTR* + *DT* + *DNR*. (**Z**, Jones)

56. PARIS, Bibliothèque Nationale lat. 1829, fols. 71–75^{v}, s. xi. Chs. 1– 14. 'Incipit liber de ratione temporum'. Jones, *BOT*, p. 166. *DTR*/*DT*.

57. PARIS, B.N. lat. 2236, fols. 1–2, s. x. Chs. 14–17. Jones, CCSL 123C, 582.

58. PARIS, B.N. lat. 2340, s. xi. 'Misplaced or lost', Jones, *BOT*, pp. 160 and 167. Omitted without comment by Jones, CCSL 123C, 580–83. *DNR*/*DT*/*DTR*?

†59. PARIS, B.N. lat. 2629, fols. 90–91^{v}, s. xi. Chs. 17–22. Jones, CCSL 123C, 582.

†60. PARIS, B.N. lat. 4860, fols. 88^{v}–89^{v}, s. ix^{2}, Bodensee [Reichenau?]. Portion of the chronicle only. Mommsen, *CM* 3, 235; 242. *DNR*/*DT*/*DTR*? (**M**, Mommsen)

†61. PARIS, B.N. lat. 5001, ca. AD 855?, France. Mommsen, *CM* 3, 242 ('principium deficit'); Laistner, p. 147; *Rep. Chron.*; Mostert, *The Library of Fleury*, p. 206 (BF1052). Omitted without comment by Jones, CCSL 123C, 582.

*62. PARIS, B.N. lat. 5239, fols. 32–38, s. x, St-Martial, Limoges. ‘Incipit liber de temporibus’. Mommsen, *CM* 3, 236; 242; Jones, *BOT*, p. 166. *DNR*/*DT* + *DTR*.

*63. PARIS, B.N. lat. 5543, fols. 85–90^{v}, AD 847, Fleury. ‘Incipit liber de temporibus’. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 166; Mostert, *The Library of Fleury*, pp. 207–8. *DTR*/*DNR*/*DT*.

†64. PARIS, B.N. lat. 7361, fol. 42^{v}, s. xi. Chronicle continued to AM 4761 (AD 810). *DNR* quatrain/*DT chronicle.*

65. PARIS, B.N. lat. 7400B, fols. 27–31^{v}, s. ix$^{3/4}$, France; provenance Fleury? Through part of ch. 13 without *capitula* or rubrics. ‘Incipit liber de temporibus’. Jones, *BOT*, p. 166; Mostert, *The Library of Fleury*, p. 216 (BF1104). *DNR*/*DT*.

66. PARIS, B.N. lat. 7418A, fols. 26–33, s. xii, Brittany. Stevens, App. 1, p. 678; Borst, *Schriften*, pp. 274–76.

67. PARIS, B.N. lat. 13013, fols. 37–40^{v}, ca. 830, Auxerre; later St-Germain. Chs. 1–16. No titles or rubrics. Jones, *BOT*, p. 166. *DNR*/*DT* + *DTR*.

†68. PARIS, B.N. lat. 13372, s. xi, St Germain. Mommsen, *CM* 3, 242.

69. PARIS, B.N. lat. 14088, fols. 59^{r-v}, 82–84^{v}, s. ix, France? Chs. 1–5, 11–14, 20–22. Jones, *BOT*, p. 166; Beeson, p. 79; Mostert, *The Library of Fleury*, p. 235. *DTR* + *DNR*/*DT*.

70. PARIS, B.N. lat. 15685, fols. 10–14, s. ix, prov. Sorbonne. No *incipit*. Chs. 1-16. Jones, *BOT*, p. 166. *DNR*/*DT*.

*71. PARIS, B.N. lat. 16361, p. 18, s. xii, prov. Sorbonne. No *incipit*. Gathering lost after title to ch. 2. Jones, *BOT*, p. 166. *DNR*/*DT* + *DTR*.

*72. PARIS, B.N. Nouv. acq. lat. 1615 (Libri 90), fols. 135–140^{v}, s. ix, Auxerre or Fleury?; provenance Fleury. ‘Incipit liber de temporibus’. Mommsen, *CM* 3, 237; 242; Jones, *BOT*, p. 166; Mostert, *The Library of Fleury*, p. 243 (BF1258). *DTR* + *DNR*/*DT*.

73. POMMERSFELDEN, Gräflich Schönbornsche Bibliothek 53, fols. 13^{v}–23^{v}, s. xii. Jones, CCSL 123C, 581 (no. 182). *DNR*/*DT* + *DTR*.

†74. PRAGUE, Národní Knihovna IV C 4 [Universitätsbibliothek 630], fols. 240–241^{v}; fols. 294^{v}–296, s. xv. Two copies of the *Chronica minora*. Mommsen, *CM* 3, 242; *Rep. Chron*.

75. ROUEN, Bibliothèque municipale A292 [26], fols. 173^{v}–180, s. ix, Jumièges. No *capitula*. *Formulae* in ch. 13 give AD 811 as *annus praesens*. ‘Liber bede de temporibus’. Jones, *BOT*, p. 166; *Rep. Chron*. *DNR*/*DT*.

76. ROUEN, Bibliothèque municipale U74 [1177], fols. 278^{v}–282^{v}; 299–302 [Mommsen, ‘f. 229’], s. xii, Jumièges. Two copies of *DT*.

(a) ‘Incipit libellus Bede presbyteri de temporibus minor. Tempora momentis horis … secundum LXX vm dcccc xxv. Explicit libellus Bede de temporibus minor’ (evidently, a copy of a text transcribed in AD 727 [5925–5198 (years to the Incarnation according to the Septuagint) = 727]) (b) ‘Tempora momentis horis … Artarxexes [*sic*] annis xl Esdra legem …’ (ch. 21). Mommsen, *CM* 3, 242; Jones, CCSL 123C, 581 (no. 187) [but this is Rouen 1177, not 524, as Jones’s cross-reference to CCSL 123B, 252 (no. 187) implies]; *Rep. Chron*. *DT*/*DNR* + *DT*.

77. ST GALL, Stiftsbibliothek 248, pp. 92–98, s. ix, St Gall or northern France. ‘Incipit secundus’. After ch. 15: ‘Finit liber ii. incipit de sex aetatibus mundi’. Last page (*Herminigildus rex … Deo soli patet*) lost. Separate c*apitula*, p. 227, s. xi. Mommsen, *CM* 3, 237; 242; Jones, *BOT*, p. 166; Borst, *Schriften*, p. 288. *DNR*/*DT* + *DTR*. (**Sg**, Kendall/Wallis)

*78. ST GALL, Stiftsbibliothek 250, pp. 146–63, ca. 889, St Gall. ‘De Temporibus’. Mommsen, *CM* 3, 237; 242. *DTR* + *DNR*/*DT*/*DTR*. (**S**, Jones)

†79. ST GALL, Stiftsbibliothek 251, before 820, pp. 26–32, St Gall. Mommsen, *CM* 3, 237; 242. *DT* chronicle + *DNR*/*DTR*. (**H**, Mommsen, also Kendall/Wallis)

†80. ST GALL, Stiftsbibliothek 570, s. ix, pp. 1–6, St Gall. Mommsen, *CM* 3, 242.

81. ST GALL, Stiftsbibliothek 878, pp. 262–76, AD 827–829, Fulda? Walafrid’s *computus*. Mommsen, *CM* 3, 242. *DNR*/*DT*.

82. SCHAFFHAUSEN, Stadtbibliothek 61, fols. 9–15, s. x. ‘Incipiunt capitula libri ii de temporibus’. Jones, *BOT*, p. 166. *DNR*/*DT* + *DTR*.

†83. SIENA, Biblioteca Comunale degli Intronati K X 23. Excerpts. Mommsen, *CM* 3, 242.

84. STRASBOURG, Bibliothèque municipale 326, fols. 11–15v(?), s. x. Jones, *BOT*, p. 161; 167. *DNR*/*DT*/*DTR*.

85. STUTTGART, Württembergische Landesbibliothek V 20, s. ix/x. *Rep. Chron*.

86. TOURS, Bibliothèque municipale 334, s. ix. *Rep. Chron.*; see Jones, CCSL 123B, 253.

†87. TRIER, Stadtbibliothek/Stadtarchiv 1975/624 4°, fols. 357–358, s. xv. Chs. 16–22. Laistner, p. 147; Jones, CCSL 123C, 583; Franz and Lehnart, *Karolingische Beda-Handschrift*, p. 68 (Westgard).

88. TRIER, Stadtbibliothek/Stadtarchiv 2500, fols. 149–156, s. ix, St Maximin’s, Trier. Franz and Lehnart, *Karolingische Beda-Handschrift* (Westgard); Laistner’s Munich, ‘untraced’, p. 147; formerly Koblenz, Görrische Bibliothek 16; see also Jones *BOT*, p. 160. *DNR*/*DT*/*DTR*.

89. TURIN, Biblioteche Civiche 176, AD 926–950? St Gall? Mommsen, *CM* 3, 242; Jones, CCSL 123C, 583.
90. VALENCIENNES, Bibliothèque municipale 174, fols. 13^{v}–22, s. ix, St Amand. 'Incipit liber de temporibus'. Jones, *BOT*, p. 167. *DTR + DNR*/ *DT + DTR*.
91. VALENCIENNES, Bibliothèque municipale 343, fols. 8–13, s. x, St Amand. Heavy glosses. 'Liber bedae de temporibus'. Jones, *BOT*, p. 167. *DT*/*DNR + DTR*.
92. VATICAN CITY, Biblioteca Apostolica Vaticana, Barberini lat. 477, fols. 88–99, s. xi. 'Incipit liber de tempora et horis et momentis'. Jones, *BOT*, p. 167. *DNR*/*DT*.
93. VATICAN CITY, B.A.V., Ottobon. lat. 6, fols. 18^{v}–22^{v}, s. xii. 'Incipit eiusdem de ratione temporum'. 'Explicit breviarum bedae de temporibus'. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 167. *DNR*/*DT*/*DTR* (ch. 4 only).

†94. VATICAN CITY, B.A.V., Pal. lat. 973, s. ix/x. Mommsen, *CM* 3, 242.

95. VATICAN CITY, B.A.V., Pal. lat. 1447, fols. 3–6, s. ix^{1}, Mainz. 'Bede's *De Temp* in garbled form'. Ch. 1 from another source; ends with ch. 13. 'This text is copied exactly in *Pal. Lat. 1448*, which also contains [*DT* in fols. 82^{v}–92]'. Jones, *BP*, p. 135; *BOT*, pp. 164–65; Laistner, p. 147; Jones, CCSL 123C, 583.
96. VATICAN CITY, B.A.V., Pal. lat. 1448, fols. ?–?; 82^{v}–92, s. ix^{1}, Trier; Mainz. Two copies of *DT*. The first is an exact copy of Pal. lat. 1447 (see above). The second, fols. 82^{v}–92: no *incipit*. Mommsen, *CM* 3, 242; Jones, *BP*, p. 135; *BOT*, p. 164. Jones's CCSL 123C, 581 (no. 212), 'foll. 3^{r}–6^{r}', is probably meant for Pal. lat. 1447 (see CCSL 123B, 253 (no. 212). *DT*/*DTR + DT*/*DTR*. (**P**, Mommsen)
97. VATICAN CITY, B.A.V., Pal. lat. 1449, fols. 112^{v}–117, s. ix, Mainz or Lorsch. 'Incipit liber de tempora et horis et momentis'. Jones, *BOT*, p. 167; Borst, *Schriften*, p. 300. *DTR*/*DNR*/*DT + DTR*.

*98. VATICAN CITY, B.A.V., Regin. lat. 123, fols. 18, 27^{v}, 33^{v}, 46^{v}–48^{v}, 86^{v}, 95, 105, AD 1056, Ripoll. Scattered chapters (5, 7, 8, 17–22, 12, 11, 15) intermingled with chapters from *DTR*. Mommsen, *CM* 3, 236; 242; Jones, *BOT*, p. 167. (*DTR + DT + DNR*).

99. VATICAN CITY, B.A.V., Regin. lat. 755, fols. 93–95, s. x, St-Columba, Sens (Jones); St-Trinité of Fécamp or St-Berthe of Blangy. Chs. 1–6 lost. 'Explicit libellus minor bedae de temporibus'. Mommsen, *CM* 3, 236–37; 242; Jones, *BOT*, p. 167; Mostert, *The Library of Fleury*, p. 276 (BF1463). *DTR*/*DNR*/*DT*.

100. VATICAN CITY, B.A.V., Regin. lat. 1038, fols. 135^{v}–139^{v}, s. x. ‘Incipit liber de temporibus’. A few lines are missing. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 167. *DTR*/*DNR*/*DT*.

101. VATICAN CITY, B.A.V., Regin. lat. 1260, fols. 7^{v}–12, s. ix, Fleury. Careless; rubrics never filled in. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 167; Mostert, *The Library of Fleury*, p. 279 (BF1482). *DNR*/*DT*.

102. VATICAN CITY, B.A.V., Regin. lat. 1405, fols. 84–102, s. xi. Without *capitula*. ‘Incipit eiusdem liber primus de temporibus’. Mommsen, *CM* 3, 242; Jones, *BOT*, p. 167. *DNR*/*DT*.

*103. VATICAN CITY, B.A.V., Rossi lat. 247, fols. 19^{v}–23, s. AD 1018? St-Chaffre du Monastier. Ends with ch. 14, which is split, as in London, Egerton 3088, and Zürich, C 62. ‘Incipit secundus de ratione temporum’. Jones, *BOT*, p. 167; Borst, *Schriften*, p. 308. *DNR*/*DT* + *DTR*.

104. VATICAN CITY, B.A.V., Vat. lat. 642, fols. 6^{v}–11, s. xi, from Lyons. ‘Incipit liber bedae de temporibus’. Jones, *BOT*, p. 167. *DNR*/*DT* + *DTR*.

105. VATICAN CITY, B.A.V., Vat. lat. 643, fols. 9–15, s. xii, Melk? ‘Incipit liber secundus’. Jones, *BOT*, p. 167. *DNR*/*DT*/*DTR*.

106. VATICAN CITY, B.A.V., Vat. lat. 644, fols. 7–11, s. x, St Gall. Chs. 1–3 lost. Heavy marginal glosses. Jones, *BOT*, p. 167. *DNR*/*DT* + *DTR*.

†107. VIENNA, Österreichische Nationalbibliothek 557, s. xii. Mommsen, *CM* 3, 242.

†108. VIENNA, Österreichische Nationalbibliothek 580, s. xi. Chronicle only. Mommsen, *CM* 3, 242; Laistner, p. 148; Jones, CCSL 123C, 583.

109. VIENNA, Österreichische Nationalbibliothek 3399, s. xvi. *Rep. Chron.*

110. ZÜRICH, Zentralbibliothek C 62, s. x, fols. 232^{v}–236, St Gall. Chs. 1–15. Chs. 1 and 2 combined. Ch. 5 (6) ‘De ordinatione romanorum’; ch. 7 (8) ‘De iiii temporibus annis’. Ch. 13 (14) is split, as in London, Egerton 3088, and Vatican City, Rossi 247. No chronicle. ‘Explicit liber bedae de natura rerum et de ratione temporum’. Jones, *BOT*, p. 167. *DNR*/*DT*.

111. ZÜRICH, Zentralbibliothek Car C 176, fols. 182–187, s. x/xi. Chs. 1–16. ‘Incipit liber minor bede de temporibus’. *DTR* is said to be fols. 174–231^{v} (Jones, CCSL 123B, 255). Jones, *BOT*, p. 167. *DT*/*DNR* inserted into *DTR*?

112. ZWETTL, Zisterzienserstift 296, fols. 12^{v}–20^{v}, s. xii/xiii. HMML no. 6889. *DNR*/*DT*/*DTR*.

The following manuscripts listed or mentioned by Laistner, Jones, or others have been excluded:

AMIENS, Bibliothèque municipale 222, *DT*, fols. 1–7^{v}, s. ix. Incomplete. Stevens, App. 1, p. 678. However, Jones, *BOT*, 149, who personally examined the manuscript, assigns these folios to *DTR*. See *DNR*, no. 3.

BASEL, Universitätsbibliothek B IV 23, *DNR*. Laistner, p. 144, under DOUBTFUL: 'It is not clear that these excerpts are from *DNR*'; omitted without comment by Jones, CCSL 123A, 175.

CAMBRIDGE, St John's College 221, *DNR*. Delete; confusion with *DTR*, see Jones, CCSL 123A, 176.

CHARTRES, Bibliothèque municipale 19, *DNR*, fols. 87^{v}–94^{v}, s. x, Chapter library. Destroyed. No title. 'Finit liber primus'. *DTR*/*DNR*. Jones, 'MSS of Bede's *DNR*', p. 431.

CHARTRES, Bibliothèque municipale 70, *DNR*, fols. 72–73, s. ix. Destroyed. Began in ch. 44: 'ut uinculis discurrentibus …' 'Explicit liber de naturis rerum'. Jones, 'MSS of Bede's *DNR*', p. 431.

CHARTRES, Bibliothèque municipale 80, *DNR*, s. ix, fols. 19–34^{v}, St Père. Destroyed. Incomplete. Laistner, p. 140.

*DURHAM, Durham Cathedral, Hunter 100, *DT*, fols. 59^{r}–60^{v}, s. xii^{1}. These folios contain definitions based on Bede's *DTR*/*DNR*, but which are not actual quotations from these works. E.g., 'De die. Duobus modis dicitur dies. Naturaliter et uulgariter. … De sole et luna et stellis. Sol dicitur eo quod solus luceat. Et luna dicitur lucina. Stelle autem dicuntur a stando. eo quod fixe sunt in firmamento …'.

ÉVREUX, Bibliothèque municipale 60, *DNR*, s. xii, Abbaye de Lyre. + *DTR*. Laistner, p. 140; omitted without comment by Jones, CCSL 123A, 176. According to the *Catalogue général des manuscrits* 2, 438, this MS contains only *DTR*.

ÉVREUX, Bibliothèque municipale 67, *DNR*, s. xii, Abbaye de Lyre. + *DTR*. Laistner, p. 140; omitted without comment by Jones, CCSL 123A, 176. According to the *Catalogue général des manuscrits* 2, 439, this MS contains only *DTR*.

KARLSRUHE, Landesbibliothek, Carol. 339, No. 1, *DNR*. Delete, see Jones, CCSL 123A, 176.

KASSEL, Landesbibliothek 442, *DNR*. Delete, see Jones, CCSL 123A, 176.

LEIDEN, Universiteitsbibliotheek, BPL 154, fol. 87–87^{v}, s. xii. *Medieval Manuscripts in Dutch Collections*. Jones, CCSL 123B, 246, lists this folio as belonging to *DTR*.

MUNICH, Staatsbibliothek 4423, *DNR*. Delete, see Jones, CCSL 123A, 178.

OXFORD, Merton College 88 (B. 1. 11), fols. 101–121. Laistner, p. 147, followed by Jones, CCSL 123C, 582, erroneously identified this as Bede's shorter chronicle (*DT* 17–22). However, it is clear from the *incipit/excipit* recorded in Thomson, *The Medieval Manuscripts of Merton College*, p. 82 ('*Incipiunt chronica uenerabilis Bede presbiteri. Adam annorum centum triginta genuit Seth … tanto patri honore condidit*') that this is Bede's *Chronica maiora* 66 (CCSL 123B, 465–535).

PARIS, B.N., Nouv. acq. lat. 2169, fols. 5ᵛ–9ᵛ. Jones, CCSL 123A, 180, inserts this as an unnumbered cross-reference to LONDON, Cotton Caligula A XV (above): see his note on the latter MS, CCSL 123A, 176. However, fols. 5–9 are a compilation of *computus argumenta*. They have been edited by Gómez Pallarès, *Studia Chronologica*, pp. 67–76, and do not contain any excerpt from *DNR*.

ST GALL, Stiftsbibliothek 299, *DNR*, fols. 293–300ᵛ, s. ix^2, St Gall. Glosses for *DNR*, *DT*, and *DTR*, but no texts: see Jones, CCSL 123A, 181.

VATICAN CITY, B.A.V., Vat. lat. 1053, *DNR*. Delete, see Jones, CCSL 123A, 183.

VIENNA, Nationalbibliothek 12600, *DNR*, fols. 97–105, s. xii/xiii, from Prüfening. Jones, CCSL 123A, 183 (with asterisk indicating he personally examined the MS). But *DTR* is said to be fols. 42–135ᵛ (Jones, CCSL 123B, 255); 'doubtful', Laistner, p. 144 See also Hermann, *Beschreibendes Verzeichniss der illuminierten Handschriften in Österreich*, pp. 73–81, and an article by an art historian who wrote her thesis on this MS, who mentions only *DTR* on fols. 42–135: Trnek, 'Die Darstellung der vier Elemente in Cod. 12600 der Österreichischen Nationalbibliothek in Wien', 7–56. Neither of them indicate that DNR is embedded in DTR.

EDITIONS OF BEDE'S *DE NATURA RERUM* AND *DE TEMPORIBUS*

(A) *De natura rerum*

SICHARDUS (Basel, 1529). The *editio princeps* of *De natura rerum*, *De temporibus*, and *De temporum ratione*, edited by John Sichardus, under the title *Bedae Presbyteri Anglosaxonis Viri Eruditissimi, de Natura Rerum et Temporum Ratione Libri Duo*. Sichardus 'used an unknown manuscript of French type'.[142] Sichardus, fols. 1–6v.

142 Jones, 'MSS of Bede's *DNR*', p. 430.

NOVIOMAGUS (Cologne, 1537). Another edition of the three works on nature and time, together with much other computistical material, edited by John Bronchorst of Nijmegen (known as Noviomagus),[143] under the title *Bedae opuscula complura de temporum ratione* … . Noviomagus used Cologne, Dombibliothek 103.[144] Noviomagus 2, fols. 1–23v.

HERVAGIUS (Basel, 1563; repr. Cologne, 1612, 1688). The first collection of the complete works of Bede, in eight volumes, under the title *Opera Bedae Venerabilis presbyteri, Anglosaxonis: viri in diuinis atque humanis literis exercitatissimi*, edited by Ioannes Hervagius (Johann Herwagen, the Younger). A reprint of Noviomagus, with additional materials. Hervagius 'used an inferior manuscript'.[145] Hervagius 2, 1–49.

MANSI (Lucca, 1761). A published transcript of Lucca, Biblioteca Capitolare 490 (our *DNR*, no. 54), edited by Gian Domenico Mansi in *Stephani Baluzii Tulelensis Miscellanea*, vol. 1, pp. 423–28.

GILES (London, 1843). In vol. 6 of the complete works in twelve volumes, *Venerabilis Bedae Opera quae Supersunt Omnia*, edited by J.A. Giles. Giles, pp. 99–122, a reprint of Noviomagus and Hervagius, with some material omitted.

MIGNE (Paris, 1850). In PL 90, ed. J.-P. Migne. Migne, cols. 187–278, a reprint of Giles and Hervagius.

JONES (Turnhout, 1975). A new critical edition, prepared by Charles W. Jones, in *Bedae Opera Didascalica* 1 (CCSL 123A, 173–234).

(B) *De temporibus* (chaps. 1–16)

SICHARDUS (Basel, 1529). See above. Sichardus, fols. 7–9v.

NOVIOMAGUS (Cologne, 1537). See above. Noviomagus 2, fols. 25–28v.

HERVAGIUS (Basel, 1563; repr. Cologne, 1612, 1688). See above. Hervagius 2, 205–210v, a reprint of Noviomagus, with additional materials.

GILES (London, 1843). In vol. 6 of the complete works in twelve volumes, *Venerabilis Bedae Opera quae Supersunt Omnia*, edited by J. A. Giles. Giles, pp. 123–32, a reprint of Noviomagus and Hervagius, with some material omitted.

MIGNE (Paris, 1850). In PL 90, ed. J.-P. Migne. Migne, cols. 277–88, a reprint of Giles and Hervagius.

143 John (Jan van) Bronchorst (1494–1570) was a native of Nijmegen (Noviomagus) in the Netherlands, not, as is sometimes asserted, Neumagen in Germany. For a bibliographical notice, see *IBN: Index Bio-Bibliographicus*, part C:1, vol. 24, 14054, and the references therein.

144 Jones, 'MSS of Bede's *DNR*', p. 430 (our *DNR*, no. 26/*DT*, no. 15).

145 Jones, 'MSS of Bede's *DNR*', p. 430.

JONES (Cambridge, MA, 1943). A new critical edition, prepared by Charles W. Jones, in *Bedae Opera de Temporibus*, pp. 293–303.

JONES (Turnhout, 1980). A reprint of Jones 1943, in Jones, *Bedae Opera Didascalica* 3 (CCSL 123C, 579–601).

(C) *De temporibus* (chs. 17–22)

SICHARDUS (Basel, 1529). See above. Sichardus, fols. 10–11v.

NOVIOMAGUS (Cologne, 1537). See above. Noviomagus 2, fols. 28v–29v.

HERVAGIUS (Basel, 1563; repr. Cologne, 1612, 1688). See above. Hervagius 2, 211–212, a reprint of Noviomagus.

GILES (London, 1843). In vol. 6 of the complete works in twelve volumes, *Venerabilis Bedae Opera quae Supersunt Omnia*, edited by J. A. Giles. Giles, pp. 132–38.

MIGNE (Paris, 1850). In PL 90, ed. J.-P. Migne. Migne, cols. 288–92, a reprint of Giles and Hervagius.

MOMMSEN (Berlin, 1898). A critical edition of the shorter chronicle, in *Chronica minora* 3 (MGH: AA 13), 223–354, edited by Theodore Mommsen.

JONES (Turnhout, 1980). A reprint of Mommsen 1898, in Jones, *Bedae Opera Didascalica* 3 (CCSL 123C, 601–611).

BEDE

ON THE NATURE OF THINGS



A POEM OF BEDE THE PRIEST

In brief chapters, I, Bede, the servant of God,
Have lightly touched on the varied natures of things
And on the broad ages of fleeting time. You who study
the stars above,
Fix your mind's gaze, I pray, on the Light of the
everlasting day. **/190/**

THE CHAPTERS OF *ON THE NATURE OF THINGS*

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2. The Formation of the World
3. What the World Is
4. The Elements
5. The Firmament
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45. The Position of the Earth
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51. The Division of the Earth

End of the Chapters of *The Nature of Things* **/192/**

THE BOOK OF *THE NATURE OF THINGS*

1. The Fourfold Work of God[1]

The divine power, which created and governs all existing things, can be understood in four different ways:[2] First, that *all these things were not made but are eternal in* the dispensation of the *Word of God*,[3] *who*, as the Apostle testifies, *predestined us*[4] for his kingdom *before the times of the world*.[5]

Second, that the elements *of the world* were made all at the same time in unformed matter, when he who lives eternally *created everything at once*.[6]

Third, that the same matter is formed into a heavenly and an earthly creation, *partly from existing causes, and partly from causes not yet existing*,[7] but each thing coming into existence by the distinct workings of the first six days.

Fourth, that the temporal constitution of the whole world is brought about in the natural course of things by *the seeds* and *primordial causes*[8] of this same creation, wherein the Father and the Son work right up to the present, and God even *feeds the ravens*[9] and clothes *the lilies*.[10]

2. The Formation of the World

At the very beginning of creation, heaven, earth, the angels, air, and water were made from nothing. *Indeed, light was made on the first day* **/193/** and

1 Cf. Augustine, *Confessiones* 12.7-8; Junilius, *De partibus* 1.19 (PL 68, 23–24).

2 See Commentary.

3 Augustine, *DGAL* 6.10 (CSEL 28.1, 182.18-19).

4 Eph. 1:5.

5 2 Tim. 1:9; Titus 1:2. See Commentary.

6 Ecclesiasticus 18:1, quoted in Augustine, *DGAL* 6.10 (CSEL 28.1, 182.19-20).

7 Augustine, *DGAL* 6.10 (CSEL 28.1, 182.20-21). Augustine is distinguishing between instantaneous and diachronic creation from *rationes seminales* – a distinction Bede later takes up in *DTR* 5 (ed. Jones, 286–87; *The Reckoning of Time*, trans. Wallis, pp. 20–21).

8 Augustine, *DGAL* 6.10 (CSEL 28.1, 182.23-24).

9 Luke 12:24.

10 Luke 12:27. Plummer, *BOH* 1, xxxviii, stressed the importance of Bede's insistence on natural law in this sentence. We think rather that the key idea here is God's providence as a continuation of creative action.

it was made from nothing. *On the second, the firmament* was made in the midst of the waters. *On the third*, the visible form of *sea and earth* was made,[11] together with those things that ad*here to the earth by the roots*.[12] *On the fourth, the lights of heaven* were made from the light that was made on the first day. *On the fifth, swimming and flying things* were made from the waters. *On the sixth, the rest of the animals* were made from the earth, *and man*[13] was created, in the flesh of course from the earth, but in the soul from nothing. He was placed in paradise, which *God had planted from the beginning*.[14] On the seventh God rested, not from the governance of creation, since *in him we live, and move, and are*,[15] but from the creation of new material. **/194/**

3. What the World Is

The world is the entire universe, which consists of heaven and earth,[16] *rounded* out of four elements *into the appearance of a complete sphere*:[17] out of fire, by which the stars shine; out of air, by which all living things breathe; out of the waters, which barricade the earth by surrounding and penetrating it; and out of *earth* itself, which is *the middle and lowest* portion of the world. It *hangs suspended, motionless, with the universe whirling around it*.[18] But heaven is also called *by the word* '*mundus*', meaning '*elegant',*[19] *from its perfect and absolute elegance*;[20] for *it is called 'cosmos' by* the Greeks from its adornment.[21] **/195/**

4. The Elements

The elements differ from one another both by nature and by position. *For earth*, since it is *the heaviest substance* and that which cannot be supported by another *substance*, holds the lowest *place among created things*. *Water* is *as much lighter than earth as* it is *heavier than air*. If perchance air is

11 Junilius, *De partibus* 2.2 (PL 68, 25).

12 Augustine, *De Genesi ad litteram imperfectus liber* 11.35 (PL 34, 234).

13 Junilius, *De partibus* 2.2 (PL 68, 25).

14 Gen. 2:8.

15 Acts 17:28.

16 Isidore, *DNR* 9.1 (Fontaine, *Traité*, p. 207).

17 Pliny, *NH* 2.2.5.

18 Pliny, *NH* 2.4.11.

19 The Latin noun *mundus* can mean 'world' or 'the heavens'; the adjective *mundus means 'elegant'*.

20 Pliny, *NH* 2.3.8.

21 Isidore, *Etym*. 13.1.2.

introduced under the water in any vessel, it *at once escapes* to the upper parts, since it is lighter.[22] *Likewise fire that is kindled* by matter constantly seeks its natural place *above the air*; but, lest *it reach* that place, *it vanishes into the mild*[23] *air*, by *the circumfusion* of which it is suppressed.[24]

These elements nevertheless *are so mingled* with each other by a certain affinity *of nature* that *dry and cold earth* is associated *with cold water*; *cold and moist water* is associated with *moist air*; *moist and hot air* is associated with hot fire; **/196/** and *hot and* dry *fire* is associated with *earth*.[25] Hence we not only see fire in the earth but also clouds and earthy bodies in the air.

5. The Firmament[26]

Heaven is of a fine and fiery nature, and round and arranged on all sides at equal distances from the centre of the earth. Hence it appears to be *vaulted and centred wherever it may be viewed*. Those who are knowledgeable about the world have stated that it *revolves* daily *with indescribable swiftness*,[27] so that it would destroy itself if it were not restrained by the countervailing course of the planets. They make this claim upon the evidence of the stars, which always revolve in a fixed course *with the northern stars making tighter circles around the axis*.[28] They call its extremities, around which the sphere of heaven revolves, the poles, which shrivel with the icy cold.[29] One of them, *mount*ing *up* in the north **/197/** is called the North Pole; the other, *sloping downwards to the south*[30] and directly opposite the land [of the northern hemisphere], is called the South Pole, which holy Scripture calls '*the chambers of the south*'.[31]

22 See Commentary.

23 A ninth-century glossator (Berlin, Phillipps 1832; our *DNR*, no. 10) glosses *mollem* as *aquaticum* (see *DNR apparatus*, CCSL 123A, 195), which seems right. Lower air (the air immediately surrounding and blanketing the earth) was understood to be suffused with water, and just as terrestrial fire had to be fed with matter it was extinguished by water.

24 Ps.-Isidore, *DOC* 4.5-6 (Díaz y Díaz, pp. 106–8; PL 83, 922).

25 Ambrose, *Hex.* 3.4.18 (CSEL 32, 71.18–72.10); Isidore, *DNR* 11.2 (Fontaine, *Traité*, p. 215).

26 The firmament is distinguished from the upper heaven which is above it (see ch. 7, below).

27 Pliny, *NH* 2.3.5-6.

28 Augustine, *DGAL* 2.10 (CSEL 28.1, 48.3-4).

29 Cf. Isidore, *Historia de regibus*, Prologue [encomium to *Hispania*] (PL 83, 1057): [*Hispania*], *nec glaciali rigore tabescis*, '[Spain], you do not shrivel with icy cold'. See Commentary.

30 Vergil, *Georg.* 1.241.

31 Job 9:9.

6. The Varied Height of Heaven

But *the world*[32] *does* not *rise up at this higher pole* so that *these stars* may be *visible everywhere. The fact is that the same stars that are thought to be higher up by those who are nearest them seem to be submerged by those who are distant. And just as this pole now seems high to persons placed on this slope, so to those who crossed over to that downward slope of the earth other stars rise up, and the ones which had been lofty in this place set*,[33] *as the curvature of the earth blocks the intervening view*,[34] to such an extent that *the seven stars*,[35] which hang from our perspective from the pole, *appear* in some places *in India only for fifteen*[36] days in the year.[37]

7. Upper Heaven

The heaven of the upper orbit set apart by its own boundary and **/198/** located *at an equal distance in every direction* [from the earth at the centre] is the dwelling place of the angelic *powers*. These, in order to visit us, take ethereal bodies for themselves so that they can be like men even in eating, and they lay aside the same when they return there. *God tempered* this heaven *with* icy *waters lest it set fire to the lower elements*. *Hence he established* the lower heaven *not with uniform but with complex motion, calling* it *the 'firmament' on account of its support*[38] *of the upper waters*.[39]

8. The Heavenly Waters

Some people maintain *that the waters placed above* the firmament, *lower* indeed *than the spiritual heavens but nevertheless superior to* every corporeal *creation*, **/199/** *were reserved* for the inundation of *the Flood*, but others claim more correctly that they were suspended to *temper* the fire of *the stars*.[40]

32 *Mundus*, i.e., the heavenly sphere, not the earth.

33 Pliny, *NH* 2.71.179.

34 Pliny, *NH* 2.71.177.

35 I.e., the Little Bear.

36 Pliny, *NH* 2.75.184.

37 In other words, in the upper latitudes of the northern hemisphere, the Little Bear is high overhead; further south, it is closer to the horizon.

38 *sustentationem*, **GSg**, Giles, Migne, Isidore; *sustentionem*, Jones.

39 Isidore, *DNR* 13.2 (Fontaine, *Traité*, p. 225).

40 Ps.-Isidore, *DOC* 3.4-5 (Díaz y Díaz, pp. 102–4; PL 83, 920–21). The 'others' are Ambrose (*Hexameron* 2.3) and Jerome: see Picard, 'Bede and Irish Scholarship', p. 141.

9. The Five Circles of the World

The world is divided by *five circles*.[41] *In accordance with these divisions some regions are inhabited by reason of their moderate temperatures, and some are uninhabitable because of their excess of cold or heat*.[42] The first is *the northern zone, uninhabitable from the cold*, *the stars* of which *never set from our sight*.[43] *The second is the summer solstitial*, extending *from the highest part of the zodiac toward our northern region*, *temperate and habitable*.[44] *The third is the equinoctial*, *occupying the middle circuit of the zodiac*, *torrid and uninhabitable*.[45] *The fourth is the winter solstitial*, extending from the lowest part **/200/** of the zodiac *toward the* southern *pole*, *temperate and habitable*.[46] *The fifth is the southern* zone around the southern pole, which is hidden [from our sight] by [the bulge of] the earth,[47] *uninhabitable* by reason of the cold.[48]

The three middle *circles mark the differences of the seasons*,[49] since the sun occupies one[50] at the summer solstice, another[51] at the equinox, and

41 Isidore, *DNR* 10.1 (Fontaine, *Traité*, p. 209). See Commentary.

42 Isidore, *Etym*. 3.44.1.

43 Pliny, *NH* 2.71.177; Isidore, *DNR* 10.1 (Fontaine, *Traité*, p. 209). I.e., the North Frigid zone from North Pole to the Arctic Circle.

44 Pliny, *NH* 2.70.177; Isidore, *DNR* 10.2 (Fontaine, *Traité*, p. 209). I.e., the North Temperate zone from the Arctic Circle to the Tropic of Cancer. The 'highest part of the zodiac' = the point at which sun's path (the ecliptic) touches the Tropic of Cancer at the summer solstice.

45 Pliny, *NH* 2.70.177; Isidore, *DNR* 10.1-2 (Fontaine, *Traité*, p. 209). I.e., the Torrid zone on either side of the equator from the Tropic of Cancer to the Tropic of Capricorn. The assertion that the Torrid zone was uninhabitable continued to be made up to the fifteenth century, when it was repeated by Pierre d'Ailly in his *Imago Mundi*. Columbus jotted a note in the margin of his copy refuting the assertion on the basis of his own observation of the large population of the Portuguese trading citadel of Mina on the Gold Coast of Africa. See Morison, *Admiral of the Ocean Sea*, p. 41.

46 Pliny, *NH* 2.70.177; Isidore, *DNR* 10.1-2 (Fontaine, *Traité*, p. 209). I.e., the South Temperate zone from the Tropic of Capricorn to the Antarctic Circle. The 'lowest part of the zodiac' = the point at which sun's path (the ecliptic) touches the Tropic of Capricorn at the winter solstice.

47 Bede makes his meaning clearer in *DTR* 34, where he states that the southern zone 'is always hidden from us because the Earth blocks it out' (Wallis, *The Reckoning of Time*, p. 98). Cf. Pliny, *NH* 2.71.177-78, for extended treatment of the effect of the earth's curvature.

48 Isidore, *DNR* 10.1-2 (Fontaine, *Traité*, p. 209). I.e., the South Frigid zone from the Antarctic Circle to the South Pole.

49 Pliny, *NH* 2.70.177.

50 The Tropic of Cancer.

51 The equator.

the third[52] at the winter solstice.[53] For the outermost ones[54] always lack the sun.[55] Hence the sea is found to be frozen one day's sail to the north from the island of Thule.[56]

10. The Regions of the World

There are four quarters, that is, regions, of the world: *the eastern* from sunrise at the summer solstice [21 June] to sunrise at the winter solstice [21 December]; *the southern* from there[57] to sunset at the winter solstice; *the western* from there[58] to sunset at the summer solstice; and then *the northern*[59] from *sunset* at *the summer solstice* to *sunrise* of the same region [at the summer solstice].[60]

Of these, the *east*ern and *west*ern regions are called **/201/** *the gates of heaven*.[61] They are thought to be equal only for people placed in the middle of the earth,[62] for the day of the winter solstice is shorter for those living in the north, and the longer day of the summer solstice, spreading out its rising and setting, diminishes the other regions.[63] Likewise for people in the south[64] each of the aforesaid days being less extreme [in variation][65] changes the above-mentioned difference, although everywhere the setting of the winter solstice corresponds to the rising of the summer solstice upon the same line.[66] And therefore in the same way the setting of the sun always matches each and every rising of the sun after six months.[67]

52 The Tropic of Capricorn.

53 Marking the beginning of summer, of spring and fall, and of winter, respectively.

54 The Arctic and Antarctic Circles.

55 Possibly, in the sense that they never receive the vertical rays of the sun as the Tropic of Cancer does at the summer solstice, the Tropic of Capricorn at the winter solstice, and the equator at the two equinoxes, which is the point made in the previous sentence.

56 Cf. *DT* 7 and *DTR* 31 and 34.

57 I.e., from sunrise at the winter solstice.

58 I.e., from sunset at the winter solstice.

59 Isidore, *Etym*. 3.42.1 (the italicized words only).

60 Pliny, *NH* 2.79.188 (the italicized words only).

61 Isidore, *Etym*. 3.40.

62 I.e., halfway between the North Pole and the equator.

63 See Commentary.

64 I.e., below 45° N.

65 I.e, as you go south, the longest day of the year gets shorter and the shortest day longer.

66 See Commentary and Figure 2 (p. 144).

67 Cf. Pliny, *NH* 2.69.176. This sentence restates and generalizes the preceding one. See Commentary.

11. The Stars

The stars, borrowing their light from the sun, are said to *turn with the world* since they are fixed in one place, as opposed to being *carried unfixed*, *with the world standing still*. The exception is *those* **/202/** *that are called planets, that is, wanderers*.[68] The brightness of the full moon and *the eclipse of the sun prove* that *they are concealed* by the advent of the day *and never* sink *from the sky*,[69] although we see *particles of fire fallen from the ether being carried by the winds*, *and resembling the light of a wandering star*,[70] which forecast the imminent *rise* of *violent winds*.[71] But *some* stars *are productive of moisture released in liquid form, others of congealed moisture in the form of frost or of compacted moisture in the form of snow or of icy moisture in the form of hailstorms, others of a breeze of gentle warmth, others of heat, others of moisture, others of cold.* It is not only the planets, like *Saturn*, whose *transits* bring *rain*, but also certain stars that are fixed to the heavens, since they have been *stimulated by the approach of the planets or by their rays*, like *the Little Pig* in the forehead of Taurus, *which for this reason the Greeks call the Hyades from the word for rain*. *And indeed some stars are stimulated spontaneously at fixed times, like the rising of the Haedi*, **/203/** and *of Arcturus* which ascends on 13 September with *a tempestuous hailstorm*,[72] and like[73] *stormy Orion*,[74] and *Canicula* which, giving off excessive heat, rises on 18 July.[75]

12. The Course of the Planets

Seven stars, which are called *wanderers*,[76] *hang between heaven and* earth, *separated by fixed intervals*.[77] They *move in a course contrary to the world,*

68 Isidore, *DNR* 22.1 (Fontaine, *Traité*, p. 255).

69 Isidore, *DNR* 24.1 (Fontaine, *Traité*, p. 261). Isidore's fuller explanation is that some stars disappear at night when the moon is full and that some appear during the day when the sun is eclipsed.

70 Isidore, *DNR* 25.1 (Fontaine, *Traité*, p. 263).

71 Pliny, *NH* 2.36.100. That shooting stars 'forecast' high winds is clearer from Pliny's wording than it is from Bede's.

72 Pliny, *NH* 2.39.105-6; cf. *NH* 2.47.124 (Pliny states that the rise of Arcturus occurs 11 days before the autumnal equinox, i.e., 11 days before the 8th kalends of October or September 24).

73 *et ut*, **G²Sg**, Giles, Migne; *et*, Jones.

74 Vergil, *Aeneid* 1.535.

75 Pliny, *NH* 2.40.107; cf. *NH* 2.47.123 (oddly, Pliny gives the date of the rise of Canicula as 15 days *before* the kalends of August [17 July] rather than the 15th kalends of August [18 July]).

76 I.e., moon, Mercury, Venus, sun, Mars, Jupiter, and Saturn.

77 Pliny, *NH* 2.4.12.

that is, to the left, with the world always advancing to the right.[78] *And although they are borne along by it with a constant revolution of great speed and are precipitated toward the west, nevertheless* they are observed *to go with an opposite motion through their own several tracks*,[79] wandering now *lower*, now *higher*,[80] on account of **/204/** the obliquity of the zodiac. But, *impeded by the rays of the sun, they become irregular, or retrograde, or stationary*.[81]

13. Their Order

The highest of the planets is *the star of Saturn*,[82] freezing cold by nature,[83] completing a circuit of the zodiac in thirty years.[84] Next is the star of *Jupiter*, temperate, completing its circuit *in twelve years*. *Third* is the star of *Mars*, blazing hot, completing its circuit in two *years*. In the middle is the sun, completing its circuit in 365 days and a quarter.[85] *Beneath the sun* is *Venus*, which **/205/** is also called *Lucifer* and *Vesper*, completing its circuit *in 348 days*. *It never recedes further from the sun than 46 degrees*.[86] *Next to it* is *the star of Mercury*, *with a circuit swifter by nine days*. *Sometimes it shines before the rising of the sun, sometimes after its setting. It is never remoter from the sun than 22 degrees*.[87] *Last* is *the moon*,[88] accomplishing its course *in 27 and 1/3 days*, *thereafter lingering in company with the sun for two days*.[89]

At the maximum the stars of Saturn and of Mars do not appear in the sky for 170 days, the star of Jupiter for 36 days or at the minimum for ten days less, of Venus for 68 days or at the minimum for 52, of Mercury for 13 days or at the most 18.[90] For *moving with the* sun, *they are hidden*; they are

78 See Commentary.

79 Pliny, *NH* 2.6.32-33.

80 Isidore, *DNR* 22.2 (Fontaine, *Traité*, p. 255).

81 Isidore, *Etym*. 3.66.3; *DNR* 22.3 (Fontaine, *Traité*, p. 255).

82 Pliny, *NH* 2.6.32.

83 Cf. Pliny, *NH* 2.6.34.

84 Cf. Pliny, *NH* 2.6.32.

85 Pliny, *NH* 2.6.34-35.

86 The modern value is roughly 48°.

87 Pliny, *NH* 2.6.36-39. The modern value for maximum elongation is roughly 27°.

88 Pliny, *NH* 2.6.41.

89 Pliny, *NH* 2.6.44 (the phrase *non conparere in caelo* belongs with the next sentence, not this one, as a comparison with Pliny texts shows). 27 1/3 days = the zodiacal lunar month (sidereal period); 29½ days = the regular lunar month (synodic period). See ch. 21 below.

90 Pliny, *NH* 2.15.78. Pliny gives the maximum for Mercury as 17, but some MSS read 18.

never more than eleven degrees from the sun when they rise,[91] and indeed they sometimes rise seven degrees from it.[92]

14. Their Orbits

All of the planets *have their individual orbits, which in the case of the stars the Greeks call 'apsidae'* ['arcs'], *and they differ from those of the world, because the earth is the centre of the sky* **/206/** *between the two vertices that the Greeks called 'poles', and also of the zodiac which is placed obliquely between them. And all these latter*[93] *are always in agreement with the precise measurement of a pair of compasses. Therefore, the arcs of the planets arise from a unique centre for each, and for that reason they have diverse orbits and dissimilar motions, since it is necessary that the inner arcs be shorter. Therefore, the arcs that are highest above the centre of the earth are those of Saturn in Scorpio, Jupiter in Virgo, Mars in Leo, the sun in Gemini, Venus in Sagittarius, Mercury in Capricorn*, *and of the moon in Taurus,*[94] *at the midpoints of each; and the arcs that are lowest and nearest to the centre of the earth are opposite. Thus it happens that the planets seem to be propelled more slowly when they are carried along the highest circuit*, *not because they accelerate or retard their natural motions, which are fixed and unique to each of them, but because it is necessary that lines drawn from the peak of the arc come together at the centre, like the spokes of a wheel, and the same motion is felt to be at one time greater and at another time lesser, depending upon the proximity of the centre*.[95]

Moreover, *that their motion increases as long as they are in the vicinity of the earth and diminishes as they move away on high is proved especially by the greatest altitudes* **/207/** *of the moon*.[96] If you wish to know more fully about these matters, read Pliny the Elder from whom I have taken these extracts.

91 Pliny, *NH* 2.12.59. Pliny specifically restricts this statement to the three outer planets.

92 We have not found any source for Bede's final statement in this sentence.

93 I.e., the five circles of the world (see ch. 9) and the circle of the zodiac.

94 *Lunae in Tauro*, $\mathbf{G^{2}S^{v2}}$**;** Giles; Migne; om. Jones. Some editors of Pliny (Mayhoff, Rackham) incorporate the words *Lunae in Tauro* into their text of *NH* 2.13.64 on the strength of this reading in at least 13 Bede manuscripts (our *DNR*, nos. 4, 11, 64–66, 78, 92, 99, 101, 127–28, 135, 136a). See Jones, CCSL 123A, 174 (hand-list no. 3, Angers, 476).

95 Pliny, *NH* 2.13.63-64.

96 Pliny, *NH* 2.13.68.

15. Why Their Colours Change

Assuredly, each of the planets has its own colour. Saturn is white, Jupiter is shining, Mars is fiery, Lucifer is cheery,[97] *Vesper glistens, Mercury beams, the moon is alluring, and the sun glows at sunrise* before it becomes day.[98] But *the variation of their altitudes tempers their colours, since as they ascend they take on the likeness of the planets into whose air they have come, and the circle of another's path tinges the planets approaching on either side, a colder circle to pallor, a hotter one to redness*, *a windy one to* chillness*, while the sun and the conjunctions of their arcs and their outermost orbits turn them to gloomy darkness*.[99]

16. The Circle of the Zodiac

The Zodiac, or Signbearer, is an oblique circle, consisting of twelve signs, *through* which *the planets are carried. What lies beneath it* **/208/** *is the only habitable part on earth, the remaining parts beneath the poles lie waste.*[100] *Only the planet Venus passes beyond it by two degrees.*[101] *The moon also wanders through its entire width, without ever passing beyond it. The planet Mercury differs very broadly from these in its wanderings, but nonetheless in such a way that it wanders not more than eight out of twelve degrees* (*for the zodiac is that many degrees in width*)*; and these eight not equally, but two in its middle, and four above it*, *and two below it. Finally, the sun is carried unevenly in the middle of the zodiac between two degrees in a wavy, dragonlike motion*,[102] *the planet Mars is carried through four degrees in the middle*, *Jupiter along the middle and two degrees above it*, *and Saturn is carried through two degrees like the sun*.[103]

97 *gaudens*, Bede; *candens*, 'bright white', Pliny.

98 Where Bede has *postea dies*, 'before it becomes day', Pliny reads *post*(*ea*) *radians*, 'afterwards radiant'. Lucifer = Venus as the morning star; Vesper = Venus as the evening star.

99 Pliny, *NH* 2.16.79.

100 Technically the region of the earth that lies 'beneath' the zodiac extends from the Tropic of Cancer in the north to the Tropic of Capricorn in the south. Here, however, all the region of the earth between the Arctic and the Antarctic circles is considered to be 'beneath' the zodiac. Only the regions from the poles to the polar circles are outside this zone.

101 In modern terms, the zodiac by definition embraces the paths of all the planets (except Pluto), extending about 8° on either side of the ecliptic. Pliny and Bede put the width of the zodiac at 12° (see below).

102 The ecliptic *is* the apparent path of the sun, so there is no apparent sense in which the sun's course can be said to be wavy or to be carried between two degrees. Since Bede knew perfectly well that the sun's course was undeviating, it is unclear why he quotes Pliny to this effect here and repeats Pliny's idea in *DTR* 26. See Wallis, *The Reckoning of Time*, p. 77, n. 239.

103 Pliny, *NH* 2.13.66-67.

17. The Twelve Signs

The twelve signs took their names either from factors connected to the course of the year or from the fables of the pagans. For the pagans assign Aries [the Ram] *to the month of March on account of Jupiter Ammon*; hence also *in its image they depict the horns of a ram*. *They assign Taurus* [the Bull] *to April on account of the same Jupiter because according to fable he was transformed into a bull*, *Castor and Pollux* [Gemini] **/209/** to *May as an emblem of virtue*, *then Cancer* [the Crab] *to June* when *the sun* turns again *toward its lower orbits*, because *when a crab is struck, it is accustomed to direct its course backwards*, *and Leo* [the Lion] *which Hercules killed, to July on account of the strength of heat*. *They take Virgo* [the Virgin] *for August* because *at that time the earth which is burned out by the heat of summer produces nothing*, *Libra* [the Scales] *for September* on account of *the equality of day and night*, *Scorpio* [the Scorpion] *and Sagittarius* [the Archer], who was de*formed by his horse legs, for October and November on account of the lightning of those months*. *They assign Capricorn* [the Goat] *to December on account of the she-goat nurse of Jupiter. Its extremities are depicted in the semblance of a fish*, *because the final days of this month are rainy*. *They assign Aquarius* [the Water Bearer] *to January and Pisces* [the Fishes] *to February* because they are *rainy* months. *In respect to the individual signs their thirty degrees are considered truly three decades* because *the sun* courses **/210/** through them *in thirty days and ten and a half hours*, beginning *always from the middle of the month*, that is, from the day *of the 15th kalends*.[104]

18. The Milky Way

The Milky Way is a rather white shape across the middle of the highest point of the sky. It is commonly said to shine in this way because of the radiance of the sun which runs in it.[105] But this is erroneous, since it is never touched by the sun except in part of Sagittarius and Gemini, in which the zodiac intersects the Milky Way.

104 *De causis*, pp. 665–67; Isidore, *Etym*. 3.71.23-32. Bede's wording derives from *De causis*, which in turn is based partly on Isidore, but Bede evidently took some phrasing directly from Isidore. See Commentary.

105 Cf. Isidore, *Etym*. 13.5.7. Bede here corrects Isidore without naming him, as di Pilla, 'Cosmologia', pp. 141–42, and McCready, 'Bede and the Isidorian Legacy', p. 52 and nn. 41–42, point out.

19. The Course and Size of the Sun

They say that the fire of the sun *is fed by water*,[106] and that the sun is larger by far than the moon,[107] but that the moon is greater than the earth.[108] Hence the sun appears **/211/** to be of one and the same size to all, *because* the distance of its exceeding height makes *it seem to us* as if *it were a cubit in diameter*[109] – otherwise it would appear larger to the Indians when rising and to the Britons when setting. *While it is* by nature *fiery*, it also increases its heat *by the exceeding swiftness of its motion*.[110] By its varied course it divides the days and months, the seasons and years, and by approaching and withdrawing *it distributes the temperature of the air for the reckoning of the seasons*,[111] lest, if it always tarried in the same region, heat should destroy some part, and cold some other.

20. The Nature and Place of the Moon

The moon is said neither to diminish nor to increase, *but rather, illuminated by the sun*[112] on the side which it has toward it, to turn the bright or the dark side gradually to us either by receding from the sun or by approaching it.[113] **/212/** And indeed as the day grows longer**,** they say that the new moon is seen bent backwards and ascending to the north, since it is superior to the sun, but as the day grows shorter that it is upright and cast down to the south, and when it is opposite to the sun that it is always full, *being elevated with respect to the low sun and low with respect to the elevated sun*.[114] They say *that it shines for an additional 47½ minutes each day from the day after the new moon to the full moon, and by the same amount less back to the new moon*, *but that within 14 degrees of the sun it is always hidden*.[115] And they

106 Isidore, *Etym.* 3.49.

107 Cf. Isidore, *Etym*. 3.48.

108 Cf. Pliny, *NH* 2.8.49. Isidore, *Etym*. 3.48, on the contrary, states that the earth is larger than the moon. Isidore's statement appears to be taken directly from Cassiodorus, *Instit*. 2.7, c. 1218. This is another instance of Bede's silently correcting Isidore. Of course, in hindsight we know that Isidore was right and Pliny and Bede wrong. See below, ch. 22.

109 Isidore, *Etym.* 3.47.

110 Isidore, *Etym.* 3.49.

111 Isidore, *Etym*. 3.51.2.

112 Augustine, *Enarrationes in Psalmos* 10.3.28-29 (CSEL 93/1A, 222); cf. *DTR* 25.15 (CCSL 123B, 357); Wallis, *The Reckoning of Time*, p. 75.

113 I.e., as the moon moves away from or towards conjunction with the sun.

114 Pliny, *NH* 2.60.151 (curiously, Pliny is talking about rainbows, not the moon, but the principle is the same). For an explanation of the astronomical facts that Bede is presenting in this difficult sentence, see Commentary.

115 Pliny, *NH* 2.11.58.

say that the last **/213/** and the first day of the moon is visible on the same day or night in no other sign than Aries.

21. Method for Determining the Course of the Moon through the Signs of the Zodiac[116]

The moon traverses the zodiac thirteen times in twelve [synodic] lunar months, which means that it runs through each individual sign in two days, six hours, and *bes*,[117] that is, 8/12 of one hour.[118] Therefore, if you want to know what sign the moon is located in, take the day of the moon that you wish to calculate from: as for example[119] the 12th. Multiply by 4, which makes 48. Divide by 9 (9 times 5 is 45[120]). Therefore, because five signs have been traversed since the new moon appeared (which is certainly always lighted in the same constellation as the sun[121]), the twelfth moon is now in the sixth sign. Thus, if the remainder is one, you know that six hours of this next sign have been completed; if two, twelve; if three, eighteen; if four, a whole day; if eight, eight times six hours, that is, two days have been added. But always remember to subtract two of these hours for every three signs. For it is very tiresome to divide the hours in each sign step by step into twelfths.[122] Hence, in the present example, although after dividing by nine there is a remainder of three, the twelfth moon will fill out, not 18, but 16 hours of the sixth sign. And indeed as long as this moon arises at the begin-

116 Cf. *DTR* 17.

117 *Bes* was a technical term for 2/3 of a unit. Bede evidently felt that his audience would not understand it without explanation. Neither does he expect his readers to use it for the purpose of calculation.

118 The calculation for a single sign is evidently a backward calculation from a measured zodiacal lunar month (sidereal period) (= the time it takes the moon to make one complete circuit of the zodiac) of 27 1/3 days (27 1/3 days divided by 12 = 2 days and 6 2/3 hours), which figure Bede takes from Pliny (see ch. 13 above). The modern figure for the sidereal period of the moon is 27.32166 days (Chartrand, *Field Guide*, p. 634). The zodiacal lunar month contrasts with the regular lunar month (synodic period), measured from full moon to full moon, of 29½ days. The modern figure for the synodic period of the moon is 29.53059 days (Chartrand, *Field Guide*, p. 634). Thirteen zodiacal lunar months of 27 1/3 days = 355 1/3 days. Twelve regular lunar months of 29½ days = 354 days.

119 *utpote* in the sense of *utputa* (see **N²CL**). See *DTR* 17.6.

120 *quadragies quinquis* was apparently a kind of schoolboy numerical jargon for *quadraginta quinque*. Bede records the form *quinquis* in *The Reckoning of Time* 4 (*DTR* 4.30, ed. Jones, p. 185). Cf. Wallis, *The Reckoning of Time*, p. 17, n. 30.

121 The new moon is always (more or less) in the same direction from the earth as the sun (known technically as 'conjunction'), and therefore in the same sign or constellation.

122 Bede's explanation of *bes* above as 8/12 of an hour implies dividing the hour into units of twelfths.

ning or in the middle of any sign whatever, the computation is easy; but if it arises at some other time, you must remember to subtract or add to the results as many parts [of the sign] as the moon, when it was lighted in the first sign, either took away or retained.[123]

You reckon nine hours of the moon for every five days of the sun.[124] **/214/**

22. The Eclipse of the Sun and the Moon

They tell us that *the sun is hidden by the intervention of the moon, and the moon by the interposition of the earth*.[125] But *eclipses of the sun occur only at the last or the first day of the moon, which is called a 'conjunction', and eclipses of the moon only at the full moon*.[126] And *the whole sun could not be occluded by the moon coming between the earth, if the earth were greater than the moon*.[127] *Moreover eclipses of both heavenly bodies take place yearly at fixed days and hours below the earth; and yet even when they occur above the earth they cannot be discerned everywhere, sometimes on account of clouds, more often because the earth's sphere blocks the vault of the heavens.*[128] *And sometimes* **/215/** *an eclipse of the moon takes place in the fifth month after the previous one, and an eclipse of the sun in the seventh month. The latter is eclipsed twice in thirty days above the earth, but this is seen by different peoples*.[129] Sometimes *both heavenly bodies* have

123 Since the moon advances through a sign in just a little more than one day (1 day and 3 1/3 hours), the calculation will give the (approximate) right answer whether you count the days of the moon from a new moon just entering the sign or from a new moon half way through the sign (if it were the 12th day of the moon in the former case, it would be the 11th day in the latter). But if the new moon enters the sign at some other point, say a quarter of the way through the sign or a quarter of the way before the sign, you have to subtract or add the appropriate number of hours accordingly.

124 This is Bede's calculation of the ratio of the zodiacal lunar month (27 1/3 days) to the solar year (365¼ days): i.e., the moon advances through the zodiac as far in nine hours as the sun advances in five days (the ratio is 3:40). He does not reveal how he derived this ratio. Perhaps he began with a normalized solar year of 365 days, and then observed that five days is 1/73 of 365. That being the case, what is 1/73 of 27 1/3 days? The answer is eight hours and 59+ minutes. 27 1/3 days = 656 hours; nine hours X 73 = 657 hours. The approximation is very close. (In *DTR* 18, Bede calculates with the slightly less accurate ratio of 1:13.)

125 Pliny, *NH* 2.7.47.

126 Pliny, *NH* 2.10.56.

127 Pliny, *NH* 2.8.49. The logic of Pliny's argument for the relative size of the earth and the moon is faulty, but Bede accepts it. See above, ch. 20, and Commentary.

128 Pliny, *NH* 2.10.56.

129 Pliny explicitly states that Hipparchus discovered these facts about eclipses. However, if by *super terras*, 'above the earth', Pliny means the northern hemisphere, he misunderstands or misrepresents what Hipparchus probably said. Rackham, in the Loeb edition of Pliny,

been eclipsed in [an interval of] *fifteen days*.[130] *Once long ago, the moon* was *eclipsed at sunset* in a strange fashion, *while both heavenly bodies were visible above the earth*.[131] But in order that an eclipse might not occur every month, the width of the zodiac carries the moon higher or lower.[132]

23. Where there Is No Eclipse and Why

Inhabitants of the East do not experience eclipses of the sun and moon in the evening, nor do those inhabiting the West experience eclipses in the morning,[133] because of the obstruction of the earth's sphere. For, *although night* and *day are the same over the whole world*,[134] *they do not occur at the same time over the whole world*, *as the contrary position of the sphere [of the heavens] brings night or its revolution brings day*.[135] For in the time *of Alexander the Great the moon was eclipsed* in Arabia[136] *at the second hour of the night, just as the same eclipsed moon was rising in Sicily*. And *Campania experienced an eclipse of the sun, which was on the 30th of April in the consulship of Ipsanius and Fontegius,*[137] *between the seventh and the eighth hour of the day, while Armenia experienced it between the tenth and the eleventh hour*.[138] **/216/**

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explains that 'one eclipse [is visible] to the inhabitants of the northern hemisphere, the other to those of the southern'. That this is what Hipparchus meant is made clear by Ptolemy's discussion in the *Almagest* 6.7 (ed. Toomer, pp. 295–96).

130 Based on the fact, stated above, that a solar eclipse can only happen at conjunction (at the time of the new moon) and a lunar eclipse only at full moon (the 15th day of the moon). The phenomenon invoked by Bede – namely a solar eclipse and a lunar eclipse occurring within two weeks of one another (the solar eclipse at the new moon, the lunar eclipse 14 days earlier or later at the full moon), and visible from the same location – is possible, though quite rare. Pliny records such an event in the reign of Vespasian in AD 71 (*NH* 2.10.57). Another noteworthy example is the solar eclipse of 4 October 590 (recorded in Gregory of Tours) and the partial lunar eclipse of 18 October 590 (recorded in Fredegar) both of which were visible in Francia: see Schove, *Chronology of Eclipses and Comets AD 1–1000*, pp. 103–5.

131 Pliny, *NH* 2.10.57. A lunar eclipse occurring precisely at moonrise and sunset, if viewed from an elevated position with flat horizons, might leave the viewer with the mistaken impression that both sun and moon were momentarily visible at the same time.

132 Cf. Pliny, *NH* 2.7.48.

133 Pliny, *NH* 2.72.180.

134 I.e., at a given latitude, the length of any particular day or night will be the same anywhere in the world.

135 Pliny, *NH* 2.73.181.

136 Pliny says 'at Arbela', the town in Assyria where Alexander defeated Darius.

137 C. Vipstanus Apronianus and C. Fonteius Capito, AD 59.

138 Pliny *NH* 2.72.180.

24. Comets

Comets are *stars* with *flames* like *hair*. They are *born suddenly*,[139] portending *a change of royal power or plague or wars* or *winds or heat*.[140] *Some of these move in the manner of the planets, others remain immobile. Almost all are found towards the North, not in any particular part of it, but chiefly in the radiant part which takes the name of the Milky Way*.[141] *The briefest period of time that they have been observed is seven days, the longest is eighty*.[142] *Hairy tails are sometimes found scattered upon the planets and the other stars. But a comet is never*[143] *found in the western part of the sky*.[144]

25. The Air

Air is *everything resembling empty space that pours forth the breath of life beneath the moon*.[145] It is capable of sustaining *the flight of birds*, and clouds and tempests.[146] It is also where the *aerial* powers, which have been *hurled down* in torment from their *celestial seat*, await the Day of Judgement in order that they may be *condemned more harshly*.[147] From it, when they appear to men, they take for themselves aerial bodies which resemble their just deserts. For *above the moon*, which advances along *the boundary* **/217/** *between the air and the ether*, the vicinity of which Mount Olympus is said to reach up and touch*, all things* are *pure and filled with the light of day*. *However, the stars are seen by us at night like other lights* shining out of *the darkness*.[148] *But the* clear *upper air* is assigned *to heaven*, while the lower air, which assumes bodily shape with *moist vapours*, is assigned to the earth, where there are *fire, hail, snow, ice,* and stormy *winds*, which are ordered to *praise the Lord from the earth*.[149] But sometimes this lower

139 Pliny, *NH* 2.22.89; Isidore, *Etym*. 3.71.17.

140 Isidore, *DNR* 26.13 (Fontaine, *Traité*, p. 273); Pliny, *NH* 2.23.91.

141 Pliny, *NH* 2.23.91.

142 Pliny, *NH* 2.22.90.

143 Rackham, the Loeb editor of Pliny (LCL 330, 234 note c), emends Pliny's *numquam*, 'never', to *nonnumquam*, 'sometimes', which may well be what Pliny wrote. But Bede's manuscript of Pliny clearly read *numquam* in agreement with the manuscripts that survive.

144 Pliny, *NH* 2.23.92.

145 Pliny, *NH* 2.38.102.

146 Augustine, *DGAL* 3.2 (CSEL 28.1, 64.16); *De Genesi contra Manichaeos* 1.15.24 (CSEL 91, 90).

147 Ps.-Isidore, *DOC* 6.7 (Díaz y Díaz, p. 124; PL 83, 927).

148 Pliny, *NH* 2.7.48. Isidore, *Etym.* 14.4.13, observes that Mount Olympus 'rises up to such heights that neither clouds nor wind are perceived on its peak' (trans. Barney et al., *The Etymologies*, p. 290). This may be the source of Bede's remark.

149 Augustine, *DGAL* 3.10 (CSEL 28.1, 73.12–74.2); Ps. 148:7-8.

air is also called heaven: hence Peter says that the heavens perished in the Flood, when the tempestuous air was converted into waves.[150] And the starry heavens of these aerial regions are called *the heavens of heavens*,[151] as if being the superior of the inferior.

26. The Winds

Wind is air moved and agitated, as *can be proved with a small fan*.[152] And *it* is *understood as being nothing else than a flow of air*,[153] which, as *Clement* says, *after being as it were compressed and channelled,* is *forced by the ordinance of God from certain high mountains and squeezed out into winds* **/218/** to quicken *crops and* temper *the heat*.[154] And they *receive their various names from the various parts of the sky*.[155]

27. The Order of the Winds

Four *of the winds* are *the cardinals*. *The first* of these, *Septentrio* [N], which is *also* called *Aparctias*, *blows straight from the Pole*, generating *cold and clouds*. On its *right side*[156] is *Circius* [NNW], *which is also called Thrascias*,[157] generating *snow and hail*. On its left is *Aquilo* [NNE], *also called Boreas*, which *condenses the clouds*.

The second cardinal wind is Subsolanus [E], *also called Apeliotes*, which brings *thunder in the East*. *It is a temperate wind*. On its *right* is *Vulturnus* [ENE], *also called Caecias*,[158] which *dries everything up*; on its *left* is *Eurus* [ESE],[159] which generates *clouds*.

The third cardinal wind is Auster [S], *which is also called Notus*. *It is moist, hot, and full of lightning*. On its right is *Euroauster* [SSE],[160] *a hot wind*. On its left is Euro*notus* [SSW], *which is temperately warm.* Because the southern winds *blow from the nether regions*,[161] they generate *greater*

150 Cf. 2 Peter 3:6.

151 Ps. 148:4.

152 Isidore, *DNR* 36.1 (Fontaine, *Traité*, p. 293).

153 Pliny, *NH* 2.44.114.

154 Isidore, *DNR* 36.2 (Fontaine, *Traité*, p. 293). The ‘Clement’ quoted by Isidore is pseudo-Clement of Alexandria, *Recognitions* 8.23.

155 Isidore, *Etym.* 13.11.1.

156 These directions are given from the viewpoint of the winds thought of as facing us.

157 In Pliny, *NH* 2.46, Thrascias is the NNW wind and Circius is a WNW wind peculiar to the province of Narbonne.

158 In Pliny, Vulturnus is SE, but Caecius is, as Bede has it, ENE.

159 In Pliny, Eurus is the Greek name for Vulturnus [SE].

160 This wind is unknown to Pliny.

161 Isidore, *DNR* 37.1-3 (Fontaine, *Traité*, pp. 295–97); cf. Pliny, *NH* 2.46.119-120.

storms at sea than northern winds. *And therefore especially destructive earthquakes happen after south winds*.[162]

The fourth cardinal wind is Zephyrus [W], *also called Favonius*, which dispels *winter* and *produces flowers*. On its *right* is *Africus* [WSW], *which* is also called *Libs*. It is a *stormy* wind, generating *thunder* and lightning; on its *left* is *Corus* [WNW], *also called Argestes*, which generates *rain clouds in the East*, **/219/** *fair weather in India*.[163]

Moreover, *there are certain winds that are peculiar to separate nations and do not advance beyond a definite* limit, *like Sciron among the Athenians, which deviates slightly from Argestes*, or *Circius* among the *Narbonnese*, which does not reach even *to the city of Vienne in the same province*.[164] *And in addition to these there are two which no matter in what location are breezes rather than winds – 'aura' and 'altanus'*; for *'aura'* is *a gentle motion of the air* on land, and *'altanus' at sea*.[165]

28. Thunder

They say that *thunder* is *produced by the crash of clouds*, when *gusts of winds conceived in* their *interior*, stirring restlessly about *in the same place and* violently bursting out *somewhere by the innate power of their mobility, resound with a great roar* like *four-horse teams bursting out from their stalls*,[166] or like a bladder which although *small nevertheless emits a great noise when it bursts*.[167]

29. Lightning

Lightning is born *from the rubbing together of clouds* like clashing *flints*. It occurs simultaneously with thunder, but *the sound* penetrates *the ears more slowly than* **/220/** the flash penetrates *the eyes*.[168] *For certainly the striking together of all things creates fire*.[169] Some say that when *air* absorbs *water into itself from the depths as vapour and fire from the upper* regions *as heat* the horrid-sounding clashes of thunder are born from their collisions; and they say that *if fire wins out* it is injurious *to crops*, *but if water*, that it is

162 Pliny, *NH* 2.48.128. Pliny imagines the south wind as being subterranean and therefore especially destructive.

163 Isidore, *DNR* 37.4 (Fontaine, *Traité*, p. 297).

164 Pliny, *NH* 2.46.120-21.

165 Isidore, *Etym*. 13.11.16-18.

166 Isidore, *DNR* 29.1 (Fontaine, *Traité*, p. 279).

167 Isidore, *Etym*. 13.8.2.

168 Isidore, *DNR* 30.1-2 (Fontaine, *Traité*, p. 281).

169 Isidore, *Etym*. 13.9.1.

beneficial.[170] *And therefore the power of lightning's fire to penetrate is the greater, because it is made of finer elements than the fire that we are accustomed to use*.[171]

30. Where Lightning Is Not and Why

Lightning is rare in winter and in summer, because *in winter the frigid* air *extinguishes whatever fiery vapour it receives*, while in summer the hot and rarefied vapours are seldom *condensed into clouds*, without which lightning does not occur. *This principle* protects *Scythia and Egypt from lightning*. *Italy* is subject to this principle,[172] where *on account of the milder winter and rainy summer it is always in some measure spring or autumn*.[173]

31. The Rainbow

The rainbow with its four colours is formed in the air from the directly opposed sun and *the clouds*.[174] **/221/** This happens when *the tip of a ray of the sun that was beamed into a hollow cloud is repulsed and the ray* is *reflected back toward the sun*,[175] like *wax* giving back *the image of a ring*. The rainbow *takes its fiery colour from the sky*, *its purple colour from the waters*, its blue colour *from the air*, and its colour green as grass *from the earth*.[176] Moreover, it is rarer in summer than in winter; and it is rarely seen at night, except at the full moon, when of course it is reflecting the moon's light.[177]

32. Clouds

Clouds are massed together into a ball drop by drop out of condensed air, which, lifting *the vapours of the waters of the land and the sea with the levity of smoke*,[178] *supports* itself aloft by its own power *as long as the vapours*

170 Ps.-Isidore, *DOC* 7.9-10 (Díaz y Díaz, p. 132; PL 83, 930).

171 Isidore, *Etym*. 13.9.2.

172 Pliny states explicitly, what Bede implies, that the principle makes thunderstorms more frequent in Italy.

173 Pliny, *NH* 2.51.135-36.

174 Isidore, *DNR* 31.1-2 (Fontaine, *Traité*, p. 285).

175 Pliny, *NH* 2.60.150.

176 Isidore, *DNR* 31.1-2 (Fontaine, *Traité*, p. 285). Bede compresses Isidore's simile of the wax almost to the point of unintelligibility. The clouds, reflecting back the rays of the sun, take on the sun's round shape (the rainbow), the way wax takes the impress of a ring. See McCready, 'Bede and the Isidorian Legacy', pp. 43–44. Eckenrode, 'Venerable Bede as a Scientist', p. 497, notes that whereas Isidore sees only two colours plus black and white, Bede sees four.

177 Cf. Pliny, *NH* 2.60.150-51.

178 For the adjective *fumalis*, which Bede takes from Ps.-Isidore, and which is not recorded in *OLD*, Blaise, Latham, Niermeyer, or Souter, see Harvey and Power, *The Non-Classical Lexicon of Latinity I: Letters A–H*.

consist of very tiny drops.[179] In this way, either *decocted by the fire of the sun* or altered by the current of the air, the vapours become fresh, even as we, by infusing sea water into the soil or *fresh* water into sea plants, are accustomed to transform [fresh or salty] *savour* into its opposite.[180]

33. Rains

Rains are formed from the little drops of the clouds. As *they coalesce into bigger drops, no longer supported by the nature of air*, sometimes driven *by the wind*, **/222/** sometimes dissolved by the sun, they fall down *in the form of rain to the earth*.[181] But *we call gentle and steady rains 'showers'*, and *sudden and violent ones 'storms'*.[182]

34. Hail

Hailstones are *coagulated* in the air from *drops* of rain, and frozen by the harshness *of cold* and wind.[183] But they are melted *more* quickly than *snow*, and they fall *more often during the day than at night*.[184]

35. Snow

Snow is formed from *the vapour* of water that, being *fore*stalled *by cold*, *is not yet condensed into drops*.[185] It is said *not to fall on the high sea*.[186]

36. Signs of Storms or Fair Weather

The sun, spotted at sunrise, or *hiding behind a cloud*, forecasts a rainy day.[187] *If it turns red*, it forecasts *a clear day*; *if it grows pale*, *stormy* weather; *if it seems flattened*, *so that, shining in the middle*, it emits *rays to the south and* **/223/** *north, wet and windy weather*; *if it sets pale into black clouds, a north wind*. *If the sky* is red *in the evening*, it forecasts a *fair* day; *if in the morning*, it signifies *stormy* weather.[188] Lightning in *the north* and thunder

179 Ps.-Isidore, *DOC* 7.5 (Díaz y Díaz p. 130; PL 83, 929).

180 Isidore, *DNR* 33.1-2 (Fontaine, *Traité*, p. 289).

181 Ps.-Isidore, *DOC* 7.5 (Díaz y Díaz, p. 130; PL 83, 929).

182 Isidore, *Etym*. 13.10.3.

183 Ps.-Isidore, *DOC* 7.6 (Díaz y Díaz, p. 130; PL 83, 930).

184 Pliny, *NH* 2.61.152.

185 Ps.-Isidore, *DOC* 7.6 (Díaz y Díaz, p. 130; PL 83, 930).

186 Pliny, *NH* 2.106.234.

187 Isidore, Bede's source (see n. 188 below), explicitly takes this observation from Vergil, *Georg.* 1.441-43. Bede's omission of this fact is therefore deliberate.

188 Isidore, *DNR* 38.4-5 (Fontaine, *Traité*, pp. 301–3). 'Red in the morning, sailors take warning; red at night, sailors delight'. Cf. Matt. 16:2-3.

in *the southeast* portends a storm,[189] and a breeze from *the south*, *heat*.[190] *If the moon when four days old*[191] *is red like gold, it forecasts winds*. If it grows dark with *spots at the top of its crescent*, it forecasts the beginning of a month of rains; *if* the *full moon* has spots *in the middle, clear* weather.[192] Likewise, *when water on a nighttime voyage sparkles at the oars*, there will be *a storm*. And *when dolphins leap* very frequently from the waters, *the wind* will rise *from the direction in which they are carried*, and the clouds, having been scattered from that place, will reveal the sky.[193]

37. Pestilence

Pestilence is born *from air that has been corrupted on account of* the deserts *of men* either *by excessive drought* or *rains*.[194] When the air has been absorbed by breathing or eating, it engenders pestilence and death. Hence we very often observe that the whole of the summer season is transformed into tempests and wintry blasts. These are called 'storms' when they come in their own season, but when they come at other times they are called 'portents' or 'signs'.

38. On the Dual Nature of the Waters

All things that are seen on earth **/224/** are formed and reformed by the dual nature of the waters. For salt water nourishes *food* in the sea for mortals on land, and fresh water is *more properly suited for nourishing food* in the air[195] and for *slaking thirst.* But the question is, which of these is *natural*? *Each* is understood to be natural *as long as* they are both able *to be turned back into one* another – fresh water when it is diffused *through the ashes of marine plants*, salt water when it is diffused *through soil*.[196]

It is a fact that the land masses are divided by numerous *sea straits, which not only demarcate the boundaries of nations but also enrich all provinces* with reciprocal wealth through *trade*.[197]

189 Isidore, *DNR* 38.2 (Fontaine, *Traité*, p. 301).
190 Isidore, *DNR* 38.5 (Fontaine, *Traité*, p. 303).
191 Isidore, *DNR* 38.3 (Fontaine, *Traité*, p. 301).
192 Isidore, *DNR* 38.2 (Fontaine, *Traité*, p. 301).
193 Isidore, *DNR* 38.1 (Fontaine, *Traité*, p. 299).
194 Isidore, *DNR* 39.1 (Fontaine, *Traité*, p. 303); *Etym*. 4.6.17.
195 *in aere*, **G²Sg**; *aere*, Giles, Migne, Jones.
196 See ch. 32 above.
197 Ps.-Isidore, *DOC* 9.1-4 (Díaz y Díaz, pp. 146–48; PL 83, 935–36).

39. The Ocean's Tide

The ocean's tide follows the moon, *as if it is forced out by its exhalation* and *flows back* when *its impulse* is *withdrawn*.[198] *It is seen* to flow and ebb *twice daily*, always with a delay of 3/4 plus 1/24 of one hour,[199] and its whole *course* is divided *into 'ledones' and 'malinae'*, that is, into lesser tides and greater tides.[200] The lesser tide, beginning from the fifth and from the twentieth day of the moon, flows in **/225/** as many hours as it flows out. But the greater tide, beginning from the thirteenth and from the twenty-eighth day of the moon, which is swifter in flood and slower in ebb, goes on for *seven days and twelve hours*. It *always* exhibits the first and the fifteenth day of the moon *in* its *middle*,[201] and it surges up *more strongly than usual* at the equinoxes and the solstices.[202] And *every eight years at* a very precise[203] *revolution of the moon* the tides *are brought back to the beginnings of their motion and to the same increases*.[204] When the moon holds a northerly course, the tides are always *gentler than when, having deviated to the south, it exerts its power by a nearer course*.[205]

40. Why the Sea Does Not Grow in Size

Because the sea is not increased by the inflow of rivers, they say that *the fresh flow*[206] is *naturally consumed by the salt* waters, or that it is carried off **/226/** by *the winds* or by *the heat of the sun*, as we prove in lakes and ponds that are dried up in a brief *period of time*, or even that it reflows by a *hidden passage* into *their own springs* and runs back *by the usual* way *through their own streams*.[207] But *fresh waters* flow above *sea waters*, because they are *lighter*; the latter certainly, being of *a heavier nature*, *better* sustain the waters poured over them.[208]

198 Isidore, *DNR* 40.1 (Fontaine, *Traité*, p. 307).

199 I.e., the tide is retarded 19/24 of an hour or 47½ minutes per day. Bede takes this figure from Pliny, *NH* 2.11.58 (see ch. 20, above), although Pliny does not apply it to the tides. In *DTR* 29, Bede gives the figure of four *puncti* or 48 minutes.

200 The *ledones* and the *malinae* are the tides over a period of a week straddling the neap tide and the spring tide, respectively. See Wallis, *The Reckoning of Time*, p. 309.

201 Ps.-Isidore, *DOC* 9.4-5 (Díaz y Díaz, p. 148; PL 83, 936).

202 Ps.-Isidore, *DOC* 9.7 (Díaz y Díaz, p. 150; PL 83, 937); cf. Pliny, *NH* 2.99.215: but Pliny asserts that the tides are weak (*inanes*) at the solstices, and in DTR 29 Bede follows Pliny.

203 *certissimo*, Giles, Migne, Jones; *centesimo*, Pliny (*NH* 2.99.215).

204 See Commentary.

205 Pliny, *NH* 2.99.215.

206 *fluentum*, Isidore, Giles, Migne, **GMSg**; *fluentem*, Jones.

207 Isidore, *DNR* 41.1-2 (Fontaine, *Traité*, pp. 309–11).

208 Pliny, *NH* 2.105.224.

41. Why It Is Bitter

They say that the sea, which is watered by so many rivers and rains, remains *salty, because*,[209] *after the fresh and clear water has been drawn out* by *the sun*, whose *fiery power attracts it very easily*, *the whole* sea *is left denser and more bitter*, and *therefore the surface water of the seas is fresher than the depths*.[210]

But it is said that the nutriment of the moon is in fresh waters just as that of the sun is in the sea.[211]

42. The Red Sea

The Red Sea takes its name from the *rosy* colour, which nevertheless *it does not* naturally *have*. *But it is tinged by its neighboring shores*, which are ruddy, *with the colour of blood*. *And therefore red lead* and *other pigments* used in paintings are gathered from there, and *red gems*. Moreover, *the Red Sea is divided into two gulfs*. Of these *the Persian* trends to the north, while *the Arabian*,[212] which is *115 miles distant from the Egyptian Sea*,[213] trends to the west. **/227/**

43. The Nile

The *Nile* River, which arises *between the East and the South*, is *utilized in place of rains* by *Egypt*, where heavy rains and rain clouds are repelled by the heat of the sun. *For in the month of May its mouths through which it flows into the sea* are blocked *by the wind blowing from the West which heaps up the sand* and holds back the waters. At this time, gradually *swell*ing *and propell*ed *backwards*, the Nile irrigates the plains of Egypt. But when the wind ceases *and the accumulation of sand is burst through*, the river is *restored* to *its channel*.[214]

209 Isidore, *DNR* 42.1 (Fontaine, *Traité*, p. 311).

210 Pliny, *NH* 2.103.222.

211 Pliny, *NH* 2.104.223. 'Nutriment' (*alimentum*) refers to Pliny's description of the sun's and the moon's power to suck water in or out of the sea or land.

212 Isidore, *Etym*. 13.17.2-5. Isidore earlier identifies the Arabian Gulf with the Red Sea (13.17.1). He seems to confuse the two gulfs at the head of the Red Sea (modern: 'Gulf of Suez' and 'Gulf of Aqaba') with the Red Sea thought of as a gulf and the Persian Gulf. Bede's Arabian Gulf is certainly the Gulf of Suez, which is roughly 100 miles from the Mediterranean. His Persian Gulf would logically have to be the Gulf of Aqaba, although he may have been as confused as Isidore about the difference between the Gulf of Aqaba and the (modern) Persian Gulf.

213 Pliny, *NH* 2.68.173.

214 Isidore, *DNR* 43.1-2 (Fontaine, *Traité*, p. 313); cf. Lucretius, *DRN* 6.712-28 (Lucretius

44. That the Earth Is Bound by Waters

The Creator encircled the globe around the middle with water, which inclined *toward the centre* of the earth *from every direction* and labouring *toward the interior* could not *fall off. In consequence, since the parched and thirsty earth was unable to cohere on its own and without moisture*, and the waters *in turn* were unable *to remain without the sustaining earth, they were joined in a mutual embrace*, *with the one opening her bosom and the other permeating the whole*, *within, without, above, below, by means of veins running throughout like bonds, and even bursting out in the highest mountain ranges*.[215]

45. The Position of the Earth

The earth is *fixed on its own foundation. The deep like a* **/228/** *garment is its clothing*.[216] For *just as the abode of fires is only in fire, of waters only in water, of air only in air, so the place of the earth is only in itself, with everything else enclosing it. Nature* contains it *and denies it any place to fall*.[217] Situated in the centre or pivot of the world, the earth, being heaviest,[218] holds the lowest and central place in creation, since water, air, and fire as it were by the levity of their nature and likewise by their situation rank above it.

46. That the Earth Is Like a Globe

We say 'the sphere' of the earth, not because it has *the shape of a perfect sphere, in view of so great* a disparity *of mountains* and *plains*, but because, *if all of its perpendicular lines*[219] *were enclosed within a circumference, it would make the figure of a perfect sphere*.[220] *And* therefore it happens *that the stars of the northern region* always appear *to us*, *but never those of the southern region*; *and in turn these northern stars are not seen by those people*, because they are blocked *by the globe of the earth*. *The country of the Troglodytes*[221] *and neighbouring Egypt do not see the Great and Little*

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was unknown to Bede [see Appendix 4], but this is a particularly interesting place to trace the flow of information from antiquity to the early Middle Ages).

215 Pliny, *NH* 2.65.165-66.166.

216 Ps. 103:5-6 (104:5-6).

217 Pliny, *NH* 2.65.162.

218 *grauissima*, **GMSg**, Migne; *gratissima*, Giles, Jones.

219 'I.e. imaginary radii drawn from the centre to the topmost point of each protuberance on the earth's surface'. H. Rackham, ed., Pliny, *NH*, LCL, vol. 1, p. 294 (note).

220 Pliny, *NH* 2.64.160.

221 I.e., Ethiopia.

Bear, nor does Italy see Canopus.[222] [… ,] although a part of this same sphere greater by nearly a half from east to **/229/** west than from south to north is inhabited, since heat prevents access southward and cold northward.[223]

47. The Circles of the Earth

The earth is divided by eight circles[224] in accordance with the variation in the length of the days. The first circle stretches from the southern *part of India* through *the neighbouring peoples of the Red Sea* and *the maritime shores of Africa* to *the Pillars of Hercules*. At this latitude *at noon on the day of the equinox a gnomon of seven feet casts a shadow four feet long*, whereas *the longest day has 14 equinoctial hours*.[225]

The second goes *from* the west of *India through* the Medes[226] and the Persians, *Arabia*, Syria, *Cyprus*, *Crete*, *Lilybaeum*.[227] It also borders on *the northern parts of Africa. A gnomon of 35 feet at the equinox makes a shadow 23 feet*[228] *long*, *whereas the longest day has 14 and 2/5 hours*.[229]

The third arises from the part of India nearest to the Imaus.[230] *It extends through the Caspian Gates*,[231] *the Taurus*,[232] *Pamphylia, Rhodes, the Cyclades, Syracuse, Catania*,[233] *and Cadiz*[234]; [*a gnomon of a 100 inches*[235]

222 Pliny, *NH* 2.71.177-78.

223 The apparent lack of concord between this and the preceding clause suggests the possibility of scribal omission, although no manuscript evidence for this has been discovered to date.

224 I.e., parallels of latitude.

225 Pliny, *NH* 6.39.212. The figures in the last sentence correspond roughly to 30°N (a gnomon/shadow ratio of 7:4 = 29°45'N [for more on the gnomon/shadow ratio, see below, p. 101, n. 266]; Maximum Daylight [MDL] of 14 hours occurs at 30°49'N). However, the Strait of Gibraltar (Pillars of Hercules) is approximately 36° N. The Mediterranean coast of Africa varies from about 30° to 36° N. Most of modern India and all of the Red Sea are south of 30° N. An equinoctial hour is 1/24 of the day.

226 Where Bede has *per Medos*, Pliny reads *per medios Parthos*.

227 A town and promontory on the western coast of Sicily (modern Marsala) at 37°48'N.

228 xxiii, Bede; xxiiii, Pliny.

229 Pliny, *NH* 6.39.213. A gnomon/shadow ratio of 35:23 (Bede) = 33°19'N; a gnomon/shadow ratio of 35:24 (Pliny) = 34°27'N; MDL of 14 hours, 24 minutes occurs at 35°28'N.

230 A western range of the Himalayas between the Caspian Sea and the Ganges.

231 A pass on the west coast of the Caspian Sea at 42° N.

232 A high mountain range in southern Turkey.

233 Both Syracuse and Catania are on the east coast of Sicily – Syracuse at 37°04'N and Catania at 37°31'N.

234 At 36°32'N.

235 *c unciae*, Pliny; *cunctae*, Bede.

/230/ *casts a shadow of 77 inches*,][236] *while the longest day has 14 and 1/2 hours, plus 1/30 of an hour*.[237]

The fourth extends *from the other slope of the Imaus* through *Ephesus*,[238] the sea of the *Cyclades*,[239] *the northern parts of Sicily, the eastern parts of Narbonese Gaul*, *and the maritime parts* of Africa[240] *to the west*; *a gnomon of 21 feet has corresponding shadows of 16 feet*, *while the longest day has 14 and 2/3 hours.*[241]

In the fifth circle *from the entrance of the Caspian Sea*[242] *are contained the Bactrians*,[243] *Armenia, Macedonia, Taranto,*[244] *the Etrurian Sea, the Baleares*, *and the middle of Spain*.[245] *A gnomon of seven feet corresponds to shadows of six*. The longest *day has 15 hours*.[246]

The sixth circle includes *the Caspian peoples, the Caucasus, Samothrace, the Illyrians, Campania, Etruria, Marseille,*[247] *the middle of the province of Tarragona in Spain; and from there it extends through Portugal*.[248] *A gnomon of nine feet makes a shadow of eight*. *The longest day has 15 and 1/9 hours*.[249]

236 *lxxuii*, Pliny; *xxxuiii*, Bede. Our translation of the bracketed clause follows Pliny. The readings *cunctae* and *xxxuiii* in the received text of Bede make no apparent sense. The misreading *cunctae* for *c unciae* suggests that it is a copyist's error at an early stage of transmission. Roman numerals are notoriously unstable. We note that the St-Gall MSS **G** and **Sg** both read *uiii* for *xxxuiii*, with signs of erasure before the first numeral.

237 Pliny, *NH* 6.39.214. A gnomon/shadow ratio of 100:77 = 37°36'N; MDL of 14 hours, 32 minutes occurs at 36°53'N.

238 At 37°55'N.

239 Where Bede has *mare Cicladum*, Pliny reads *Icarium mare, Cycladum*.

240 Where Bede has *Africae maritima … ad occasum*, Pliny reads *Hispaniae maritima a Carthagine Noua et inde ad occasum*. It seems unlikely that Bede could have been responsible for substituting Africa for Spain at this point after stating above that the second parallel 'borders on the northern parts of Africa'.

241 Pliny, *NH* 6.39.215. A gnomon/shadow ratio of 21:16 = 37°19'N; MDL of 14 hours, 40 minutes occurs at 38°15'N.

242 This is very vague. Possibly Pliny refers to the westernmost extension of the Caspian sea at roughly 44°30'N.

243 *Bactri*, **EMSg**; *Bactrii*, Jones; *Bactria*, Pliny. Bactria was a region in what is now northern Afghanistan.

244 At 40°28'N.

245 Reading *Hispania media* with Pliny; Jones (following Giles and Migne) prints *Hispania Media*.

246 Pliny, *NH* 6.39.216. A gnomon/shadow ratio of 7:6 = 40°36'N; MDL of 15 hours occurs at 41°25'N.

247 At 43°18'N.

248 *Lusitaniam*, **AGNSg**, Giles, Migne, Pliny; *Lusianam*, Jones.

249 Pliny, *NH* 6.39.217. A gnomon/shadow ratio of 9:8 = 41°38'N (this, as Bede tells us

The seventh circle *begins from the other shore of the Caspian Sea*,[250] and *goes* through *the remoter parts of Thrace, Venice, Cremona, Ravenna,*[251] *Transalpine Gaul, the Pyrenees*, *and Celtiberia*.[252] *A gnomon of 35 feet* makes *36 feet of shadow*, *while the longest day* has *15 and 3/5 hours*.[253]

The eighth extends *from the river Don through Lake Maeotis*[254] *and the country of the Sarmatae, the Dacians and part of Germany*, *and the provinces of Gaul*. The longest day has *16 hours*.[255]

The ancients put *two circles* before these: one extends *through the Isle of Meroë*[256] *and* the city *Ptolemaida on the Red Sea*,[257] *where the longest day has 12½ hours*[258]; **/231/** the other extends *through Syene*[259] *in Egypt*, *where the day has 13 hours*.[260] And they put two circles after: the first *through the Hyperboreans*[261] *and Britain with a longest day of 17 hours*[262]; the other *the Scythian* circle, *from the Rhiphaean mountain ranges*[263] *to Thule, in which the days are continued without interruption and alternately the nights*.[264]

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in the next chapter, is the gnomon/shadow ratio of Rome); MDL of 15 hours, 6 2/3 minutes occurs at 42°24'N.

250 The northern shore of the Caspian Sea, if this is what is meant, reaches 47° N.

251 Venice, Cremona, and Ravenna are at 45°26'N, 45°08'N, and 44°25'N, respectively.

252 A region in Spain between the Tagus and the Ebro rivers.

253 Pliny, *NH* 6.39.218-19. A gnomon/shadow ratio of 35:36 = 45°49'N; MDL of 15 hours, 36 minutes occurs at 46°18'N.

254 The Sea of Azov.

255 MDL of 16 hours occurs at 49°03'N.

256 The Isle of Meroë (insula Meroë) was a region of the ancient kingdom of Meroë (northern Sudan). The region was south of the city of Meroë, which was at 16°54'N. However, both Pliny and Bede understand this to be an island in the Nile (see *On Times* 48: below, p. 101). Bede gives the MDL of the city of Meroë as 12 hours, 53 minutes (see *On Times* 7: below, pp. 110–11).

257 Pliny states that Ptolemaida was built for the purpose of hunting elephants; Bede makes it a city.

258 MDL of 12½ hours occurs at 8°34'N.

259 The modern city of Aswan at 24°05'N.

260 MDL of 13 hours occurs at 16°44'N.

261 A mythical northern people; Isidore, *Etym*. 14.8.7, speaks of the Hyperborean mountains of Scythia.

262 MDL of 17 hours occurs at 54°31'N. As it happens, Bede's monastery of Jarrow was located at 54°59'N, where the MDL is 17 hours, six minutes. See *On Times* 7 (below, p. 111 and n. 30).

263 Imaginary mountains of northern Scythia.

264 Pliny, *NH* 6.39.219-20. For Thule, see *On Times* 7 (below, p. 111) and Commentary on *On Times* 7 (below, pp. 170–71).

48. More on the Same Subject: the Art of Using Sundials

At midday in Egypt on the day of the equinox, the pin of a sundial, which is called a gnomon,[265] *casts a shadow a little more than half the length of the gnomon. In the city of Rome the shadow is shorter than the gnomon by one-ninth. In the town of Ancona the 35th part of the gnomon remains [when compared with its shadow]. In the part of Italy which is called the Veneto the shadow is equal to the gnomon at these same hours.*[266]

Likewise it is said *that at Syene five thousand stades beyond Alexandria*[267] **/232/** *no shadow is cast at noon on the day of the summer solstice.* The same is *also* true *in India beyond the river Hyphasis.*[268] And they say that among the *Troglodytes*[269] *this happens on the 45th day before and after the solstice with shadows being cast to the south during the 90 days* in the middle. But also [they say that] *in Meroë, an island* of *the Nile, five thousand stades from Syene, shadows vanish twice in the year, when the sun occupies the 18th degree of Taurus and the 14th of Leo.*[270]

49. Earthquake

They say that an earthquake is caused by the wind, which, having been shut up in the earth's cavernous *sponge*-like innards, rushes through them with a terrifying roar, and labouring to escape, *shudders violently* with varied *rumblings*, and endeavours to discharge itself by shaking open a gap.[271] Hence *hollows in the earth* are associated with these quakes, seeing that they have the capacity for *wind*, *but sandy* and *solid places* lack it.[272] *For*

265 *gnomonem*, Giles, Migne; *gnomon*, **AN**; *gnomen*, Jones.

266 Pliny, *NH* 2.74.182. I.e., the gnomon/shadow ratio in Egypt is 2:1; in Rome, 9:8; in Ancona, 35:34; in the Veneto, 1:1. That is, according to these figures (tangents of 2/1, 9/8, 35/34), the sun's height above the horizon at noon on the day of the equinox in Egypt would be 63°26'; in Rome, 48°21'; in Ancona, 45°49'; in the Veneto, 45°. These heights correspond to latitudes of 26°34'N for Egypt; 41°39'N for Rome (actual 41°53'N); 44°11'N for Ancona (actual 43°37'N); and 45° for the Veneto.

267 *simili modo* [*tradunt in siene*, added in second hand] *quod est supra alexandriam*, **Sg**, Pliny; *Sieni oppido quod est* [altered from *quidem*] supra Alexandriam, **G**; *Simili modo quod est supra Alexandriam*, Jones; *Simili quidem modo est super Alexandriam*, Giles, Migne. I.e., roughly 625 miles south of Alexandria. As noted above, Syene (Aswan) is at 24°05'N, just a few miles north of the Tropic of Cancer at 23°27'N.

268 Modern Beas. In fact the Beas flows into the river Sutlej at roughly 29° N, considerably north of the Tropic of Cancer.

269 A people of Ethiopia.

270 Pliny, *NH* 2.75.183-84. Bede would have understand the 18th degree of Taurus to be 4 May and the 14th of Leo to be 31 July (see Wallis, *The Reckoning of Time*, Appendix 1).

271 Isidore, *DNR* 46.1 (Fontaine, *Traité*, p. 319).

272 Isidore, *DNR* 46.3 (Fontaine, *Traité*, p. 321).

earthquakes do *not* occur *except when the sky and the sea are calm* and the wind *is hidden in the veins* of the earth; and what is *thunder in a cloud* is *an earthquake on earth*, and what is *a bolt of lightning in a cloud* is a *fissure* on earth.[273] *Earthquakes are also accompanied by inundations of the sea, which is evidently infused with the same wind* or *drawn in by the depression as the earth subsides*.[274] **/233/**

50. The Fire of Mount Etna

The land of Sicily, which is full of *hollow places* and *strewn with sulphur and bitumen*, *lies* almost *wholly open* to *winds and fires*. *As wind* contends *with fire within*, *it* often *belches forth smoke* or *vapours* or *flames* from many *places*. And when *the wind* exerts *greater pressure*, it will even *throw up a mass of sands* or *stones*.

This is why the very long lasting *fire of Mount Etna endures like* the fires *of hell*. They say this fire is nourished *by the waves of the Aeolian Islands*,[275] as *the tumult of waters* taking *the air down with itself into the deepest* depths *gasps for a long time*, *until*, *having been diffused* through the veins *of the earth*, it ignites the kindling materials *of fire*. Hence, *when sailors* in the distance are terrified by the low roaring of the waves, *which the heaving of the sea batters* with *a sucking whirlpool*, the dogs of Scylla are fabled to be *barking*.[276]

51. The Division of the Earth

The whole circle of lands,[277] girded by the Ocean, *is divided into three parts: Europe, Asia, and Africa*. *It takes its starting-point from the West and the Straits of Cadiz*,[278] *where the Atlantic Ocean bursting in floods into the interior seas*. *For one entering from this direction, Africa is on the right, and Europe is* **/234/** *on the left*. *Asia is between them*, and is comparable in

273 Pliny, *NH* 2.81.192.

274 Pliny, *NH* 2.86.200. *residentis*, Bede; *terrae sidentis*, Pliny. Although Bede's abbreviated language can be understood, Pliny's phrase makes the meaning transparent and clearly underlies *residentis* (wherever the corruption occurred).

275 The Lipari Islands, off the north coast of Sicily.

276 Isidore, *DNR* 47.1-3 (Fontaine, *Traité*, p. 321–23).

277 The *orbis terrarum*, the 'circle of lands', is the classical term for the earth. Pliny probably means nothing more by it than the world. Bede, however, must understand it more literally as referring the three continents arranged in the shape of a disc, because he is quite clear that the earth is a sphere and because he adds the qualification that the circle of lands is surrounded by the ocean.

278 The Straits of Gibraltar.

size to the other two taken together. *Its boundaries* are *the rivers Don and Nile*. *The Straits of the Ocean* [i.e., of Gibraltar]*, which we have mentioned, extend 15 miles in length, and five in width*.[279]

Therefore *Europe* is spread out *from the West to the North*, and *Asia from the North through the East as far as the South*, *and from there Africa* is spread out *from the South as far as the West*.[280]

HERE ENDS THE BOOK OF *THE NATURE OF THINGS*

279 Pliny, *NH* 3.1.3. The Straits are about eight miles wide at their narrowest point.

280 Isidore, *DNR* 48.2 (Fontaine, *Traité*, p. 325); *Etym*. 14.2.2; Augustine, *DCD* 16.17. Augustine and Isidore, unlike Bede, give these directions in counter-clockwise order.



BEDE
ON TIMES

THE CHAPTERS OF *ON TIMES*[1]

1. Moments and Hours
2. The Day
3. The Night
4. The Week
5. The Month
6. The Months of the Romans
7. Solstice and Equinox
8. The Seasons
9. Years
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1 This list of chapters does not appear in the MSS of *DT* consulted by Jones for his edition, though it does appear in other MSS.

THE BOOK *ON TIMES*

1. Moments and Hours

Time is divided into moments, hours, days, months, years, generations, and ages. The moment [***mo**mentum*] *is the smallest and very shortest interval of time, and takes its name from the motion* [***mo**tu*] *of the stars, for it is the outermost limit of an hour and exists in the brief intervals when one thing stops and another succeeds it. The word 'hora' is Greek, but it sounds the same in Latin. An hour is a boundary of time, just as the shores* [*orae*] *are the boundaries of the sea, or of rivers, or of garments.*[2] It contains four *puncti*, ten *minuta* and 40 *momenta*.

And for the sake of avoiding error, one should take note that time-reckoning [*computus*][3] depends partly on nature, and partly on authority or custom: on nature – for example that a common [lunar] year has twelve lunar months; on custom – for example that months are computed at thirty days; and on authority – for example that the week consists of seven days.

2. The Day

In common parlance, *the day is the presence of the sun above the earth*,[4] and properly speaking it comprises 24 hours. The *Chaldeans* and the *Persians* reckon the day *between two sunrises*, the *Egyptians* between two *sunsets*, the *Romans from midnight* to midnight, the *Umbrians* and *Athenians from noon to noon*.[5] Moses called the period from morning to morning a single day; but the Lord rose from the dead *on the evening of the Sabbath, as it began to dawn on the first day*[6] of the week, so that mankind, which had

2 Isidore, *Etym*. 5.29.

3 *Computus* means generally 'calculation' or, as here, specifically the science of 'time-reckoning'. See Introduction, pp. 20–25, and Wallis, *The Reckoning of Time*, pp. 425–26. In Bede's day, the use of the term *computus* to denote a particular domain of learning or technical knowledge had not yet taken hold; hence this translation prefers the more neutral term 'time-reckoning'.

4 Isidore, *Etym*. 5.30.1; *DNR* 1.1 (Fontaine, *Traité*, p. 173).

5 Isidore, *DNR* 1.2 (Fontaine, *Traité*, p. 173); *Etym.* 5.30.4; Pliny, *NH* 2.79.188.

6 Matt. 28:1.

fallen from the light into darkness, could thenceforth return from darkness into light. **/586/**

3. The Night[7]

Night is the absence of the sun when it is concealed *by the shadow of the earth*.[8] It was created to give mortals repose lest humankind in its greed should perish through prolonged exertion. [Where the night is colder, it is also longer, so that work can be curtailed and limbs restored.[9]] *Its parts are seven*: *dusk* [***crep**usculum*], which is *that uncertain light between light and darkness, for we call what is uncertain* '***creper***'; *eventide* [***uesper**um*], when *the star* of that name [**Vesper**, i.e., Venus as evening star] appears; *the silent hours*, *when everything is hushed*; *the dead of night* [*in**temp**estum*], which *is the middle time* [***temp**us*] *of night when no activity takes place*; *cockcrow* [***gall**icinium*], when *the rooster* [***gall**us*] lifts up its voice; *early morning*, *between the departure of the darkness of night and the arrival of the sunrise*; and *daybreak* [***diluc**ulum*], *as it were the first faint light of day* [***di**ei **lux***] – *this is also known as 'dawn', preced*ing *the sunrise*.[10]

4. The Week[11]

The week comprises *seven days*; *the eighth day is the same as the first day, to which it returns* and where *the week* always *begins anew*.[12] *The pagans named the days of the week* after the planets, for they believed that they *received breath from the sun, a body from the moon, blood from Mars, intelligence and speech from Mercury, moderation from Jupiter, pleasure from Venus and sluggishness from Saturn*.[13] But St Sylvester **/587/** ordained that the weekdays were to be called *feriae*, designating the first day [*prima*

7 In *The Reckoning of Time* 6, Bede will greatly expand this material.

8 Isidore, *DNR* 2.1 (Fontaine, *Traité*, p. 181).

9 Bracketed phrase, **KSSgZ** only. Cf. *The Reckoning of Time* 7. This idea is expressed in Macrobius, *Commentary on the Dream of Scipio*, a work which Bede apparently did not know directly: see Wallis, *The Reckoning of Time*, p. 31, n. 60.

10 Isidore, *DNR* 2.2-3 (Fontaine, *Traité*, p. 181–83); *Etym*. 5.31.4-13. In *Etym*. Isidore puts *uesper* first, followed by *crepusculum*; here and below Bede seems to have borrowed from both of Isidore's accounts.

11 Absorbed and considerably expanded in *The Reckoning of Time* 8.

12 Isidore, *Etym*. 5.32.

13 Isidore, *Etym.* 5.30.8; cf. *DNR* 3.4 (Fontaine, *Traité*, p. 185). Notice that in *On Times*, Mars furnishes blood, but in *The Reckoning of Time*, ardour or fervour. The latter reading is also found in the Irish-inspired ninth-century Bobbio *computus* (Milan, Bibl. Ambrosiana H 150 Inf., transcribed in PL 129, 1300–1), though it is not clear in which direction the influence flows.

feria] as the Lord's Day, in imitation of the Hebrews, who used the terms 'first day of the Sabbath', 'second day of the Sabbath' and so forth, in numerical order.[14] For the Hebrews a 'week' unfolds over that same number of years,[15] and they also had a 'week of weeks' for days as well as for years. They call the fiftieth day Pentecost, and the fiftieth year the Jubilee, which means 'freedom'.[16]

5. The Month

*A lun*ar *month consists of the waxing and waning* of the moon,[17] as it traverses the zodiac in a little more than 29½ days; but for ease of calculation, the months of the moon alternate between 30 and 29 days. A solar month, however, is 22 hours longer. From these extra 22 hours are accumulated the 11 days of the epacts, by which the sun advances over the moon each year. For 12 times 22 makes 264, and 11 times 24 comes to the same total. The Hebrews begin the months with the new moon, and the Romans on the kalends. The Egyptians, counting each of their months as 30 days, reckon the year from the 4th kalends of September [29 August] to the 9th kalends of the same month [24 August]; they call the five days which are left over 'intercalary days'.[18] They were the first people to begin to demarcate the months according to the course of the sun, lest the swifter and less reliable course of the moon disrupt their calculations.[19] **/589/**

6. The Months of the Romans

The Romans, by order of Romulus, established *a year of ten months, or 304 days*. *Romulus dedicated the first month to his father Mars*; *the second he called April* from the *appearing* of the crops. *The third* he consecrated *to Maia the mother of Mercury*, and the fourth *to Juno*.[20] Quintilis and Sextilis,

14 Bede's information on Pope Sylvester I (314–335) comes from the section of the 'Irish computus of AD 658' published as *De divisionibus temporum* 10 (PL 90, 658B); Jones prints the relevant portions in *BOT*, pp. 394–95.

15 Cf. Isidore, *DNR* 3.1 (Fontaine, *Traité*, p. 183).

16 Cf. Isidore, *DNR* 6.4 (Fontaine, *Traité*, p. 195).

17 Isidore, *DNR* 7.7 (Fontaine, *Traité*, p. 205); cf. *Etym*. 5.33.1-2.

18 'The Hebrews begin … intercalary days': cf. Isidore, *DNR* 1.5; 4.6-7 (Fontaine, *Traité*, pp. 179–81; 189–91).

19 Cf. Isidore, *Etym*. 5.33.2. As Jones observes, this is found in the Greek original of Theophilus of Alexandria, *Prologus Theophili* (ed. Krusch, 1, 222) but not in the Latin version. Nonetheless, Isidore seems to be Bede's immediate source.

20 Bede's source is the version of the 'Debate of Horus and Praetextatus' in Macrobius, *Saturnalia* 1.12-15 (ed. Willis, pp. 53–73) found in an anonymous extract in Bede's 'Irish *computus*', of which a copy is preserved in Oxford, Bodleian Library, Bodley 309, fols.

which now are named for the birth of Julius Caesar and the victory of Augustus,[21] and the months which follow, he designated by their number.[22]

He called the beginning of the month the 'kalends', because at that time, *the people were 'called' – that is, summoned – to the Capitol* by pronouncing *the word 'calo', that is, 'I summon', five* or *seven times, and thereby it was also announced* how many days *remained until the nones*. The 'nones' are so called because on the ninth day before the ides the people *flock*ed *to the city* in order to learn what should be done that month. Again*, the ides is the day which divides the month* in half, *for 'iduare' means 'to divide' in the Etruscan language*.[23]

Numa added *two months* to these ten, naming January for Janus and February for *Februus*, the god *of purifications*, and thus he aligned the year with the course of the moon in 354 days.[24] Julius Caesar instituted the year which has been preserved until this day by adding eleven days. **/590/**

7. Solstice and Equinox

The solstices and equinoxes are each reckoned twice, on the 8th kalends of January [25 December] and July [24 June], and of April [25 March] and October [24 September][25] – that is, *in the eighth degree of Capricorn, Cancer, Aries, and Libra*.[26] What is more, the equinoctial day is of equal length the whole world over.

Due to variation in the increment of daylight, the longest day in Meroë[27]

101r–105v. Bede's knowledge of Macrobius was apparently limited to this extract (see Jones, *BOT*, pp. 107–8), but some Macrobian material may have reached him through other indirect routes of transmission: see note 9 above. He provides even more extensive quotations from this work in *The Reckoning of Time* 12. Cf. Isidore, *DNR* 4 (Fontaine, *Traité*, pp. 185–91).

21 Cf. Isidore, *DNR* 4.3 (Fontaine, *Traité*, p. 187). Julius Caesar was said to have been born on 12 July and Augustus Caesar defeated Anthony and Cleopatra on 1 August: cf. *DTR* 12, trans. Wallis, *The Reckoning of Time*, p. 47.

22 Cf. Isidore, *DNR* 4.4 (Fontaine, *Traité*, p. 187).

23 Macrobius, *Saturnalia* 1.15.10-12 (ed. Willis, p. 71).

24 Macrobius, *Saturnalia* 1.13.1-3 (ed. Willis, p. 61); cf. Isidore, *Etym*. 5.33.4.

25 Isidore, *Etym*. 5.34.2; cf. *DNR* 8.1 (Fontaine, *Traité*, p. 205). But see below, ch. 10, where Bede adopts the 'Egyptian' date for the vernal equinox.

26 Pliny, *NH* 2.17.81.

27 In this sentence, Bede is quoting Pliny, and Pliny's figures are gathered from earlier sources. For readers who may be interested in gauging the accuracy of ancient observations, we give modern estimates of latitude and maximum daylight hours. Meroë (see *On the Nature of Things* 48, and n. 256, above p. 100) was an ancient city on the Nile (now Kabushiyah in Sudan) at latitude 16°54'N. 12 8/9 hours = 12 hours and 53 minutes (Maximum Daylight [MDL] at that latitude = 13 hours, one minute).

measures 12 equinoctial hours plus eight parts [i.e., 8/9] *of one hour, but in Alexandria 14 hours,*[28] *in Italy 15,*[29] *and in Britain 17,*[30] *where the bright nights of summer* confirm *what reason compels us to believe – namely that when the sun is climbing closer to the top of the world during the days of the summer solstice*, *the lands which lie beneath, because of the narrow circuit of the light, have continuous day for six months, and then continuous night when the sun has withdrawn to the winter regions. Pytheas of Marseille*[31] *writes that this occurs on the island of Thule,*[32] *which is six days' sail to the north from Britain*.[33] **/591/**

8. The Seasons

Seasons [***temp****ora*] *are successions of changes*,[34] by which the sun **temp**ers the cycle of the year with its approach or recession. For winter, where he abides for a longer period of time, is cold and wet; spring when he returns is wet and warm; summer when he blazes fiercely is warm and dry; autumn when he retreats is dry and cold. The ancients used to begin the seasons *on the sixth day before the ides of February, May,*[35] August, and November [8 February, 10 May, 8 August, and 8 November], so that the solstices and equinoxes would be in the middle of the seasons.

Spring corresponds *to the east* [***ori****enti*], *because then everything springs out* [***ori****untur*] *of the ground; summer to the south, because its sector is more scorching with heat*; *autumn to the west*, because *it brings grave illnesses being on the border of heat and cold*; *and winter to the north because it languishes in the cold*.[36]

28 At 31°13'N (MDL = 14 hours, two minutes).

29 The latitude of Rome is 41°53'N (MDL = 15 hours, three minutes).

30 Bede's monastery of Jarrow is situated at 54°59'N. MDL at Jarrow = 17 hours, six minutes. It is possible, though evidence is lacking, that Bede could have verified Pliny's figure for Britain by direct observation. We would have been able to confirm this had he added a gnomon/shadow ratio (see *On the Nature of Things* 47 and 48: above, pp. 98–101) for Britain at the latitude of Jarrow, which Pliny does not give.

31 Greek navigator (*fl.* 310–306 BC), who circumnavigated Britain and described Thule.

32 Possibly Iceland or northern Norway.

33 Pliny, *NH* 2.77.186-87; there is a longer quotation from Pliny, including this passage, in *The Reckoning of Time* 31 (and cf. *ONT* 47). See further discussion in Commentary.

34 Ambrose, *Hex.* 4.5.21 (CSEL 32.1, p. 127.20-21); Isidore, *DNR* 7.1 (Fontaine, *Traité*, p. 199).

35 Pliny, *NH* 2.47.122-23. Pliny gives the autumnal equinox as the beginning of autumn and 11 November as the beginning of winter (*NH* 2.47.124-25).

36 Isidore, *Etym.* 5.35.8.

9. Years

A solar or civil year is when the sun *traverses* the zodiac *in 365¼ days*.[37] *The Romans* start the year *on the winter solstice*, *the Hebrews* **/592/** *at the spring equinox*, *the Greeks at the summer solstice* and *the Egyptians in the autumn*.[38]

A common lunar year is completed in *12 lunations, that is, 354 days*; *an embolismic year, in 13 lunar months, or 384 days*.[39] Both start with the Paschal lunation.

A great year is when *all the stars*, when their precise courses have been executed, *return to their proper place*.[40] Josephus says that it is completed in six hundred solar years.[41]

10. The Leap-Year Day

A leap-year day is put together by calculating quarter-days over a four-year period, because the sun returns to the same sign from which it set out not in 365 days, but with a fourth part of a day added. For example, if now the sun enters the equinoctial part of the sky[42] at dawn, it will return to that point next year at noon, in the third year in the evening, in the fourth year at midnight, and in the fifth year at dawn again. It is necessary to predict in advance the day which will be added on, for if it is not added, the vernal equinox would fall on the day of the winter solstice after 365 years. The Egyptians inserted it at the end of their year, that is, on the 4th kalends of September [29 August], and the Romans on the 6th kalends of March [24 February], from which it takes its name.[43] **/593/**

According to a more concise and commonplace explanation, the leap-year day is generated by the lagging behind of the sun, which does not quite return to the same line [on the sundial] in 365 days. For example, if you carefully observe the sun rising at the mid-point of the east at the spring equinox (which *according to the Egyptians comes on the 12th kalends of April* [21 March]),[44] one year later, on the same day, you will find that it

37 Isidore, *DNR* 6.4 (Fontaine, *Traité*, p. 195).
38 Isidore, *DNR* 6.2 (Fontaine, *Traité*, p. 193).
39 Isidore, *DNR* 6.4 (Fontaine, *Traité*, p. 195).
40 Isidore, *DNR* 6.3 (Fontaine, *Traité*, p. 195).
41 Cf. Josephus, *Ant.* 1.3.9 (ed. Blatt, pp. 136.24–137.2).
42 I.e., crossing the celestial equator.
43 *Bi(s)sextus*, 'the leap-year day' means literally 'the 6th doubled'.
44 Bede, *EH* 5.21 (Colgrave and Mynors, p. 542); Dionysius Exiguus, *Epistola ad Petronium* (ed. Krusch, 2, 65.20-22).

rises a little lower down,[45] and in the third, fourth and fifth year this drop will increase, so that unless you add on a day, the sun will arise at the mid-point of the east to make the equinox on the 11th kalends of April (22 March), as well as maintaining the same retardation in its other risings.

11. The Nineteen-Year Cycle

The Council of Nicaea instituted the nineteen-year cycle for the sake of the Paschal fourteenth moons,[46] in such a way that each and every [phase of the] moon will return on an unerring course to the same day of the solar year in nineteen years, **/594/** when 235 lunations are completed.[47] The cycle is divided into the 'ogdoad' and the 'hendecad', that is, into a period of eight years and one of eleven years. For eight lunar years surpass the same number of solar years by only two days, one of which fills the gap in the hendecad, and the other is absorbed by the calculation of the 'leap of the moon' – for otherwise, the solar hendecad would surpass the lunar by one day.

Some people arbitrarily try to assemble these days out of the leap-year days over eight years, even though the leap-year day, which is added in the month of February to [the reckoning of both] the sun and the moon, would not normally prejudice future time – and these people add no leap-year day to the hendecad. If I may put it more plainly, the two days of the moon which are in excess in the ogdoad complement the two which are wanting in the hendecad. **/595/**

12. The 'Leap of the Moon'

The advancing place and time of the appearance of the new moon over 19 years produces the 'leap of the moon'. For although some people, computing each lunation as 29½ days, alternate the first appearance of the new moon between noon and midnight, they are, in so doing, looking more to ease of calculation than to the facts of nature. For if you investigate nature, the moon of the first month, which now shows its first light at noon, and of the second month, which now does so at midnight, will in the year to come shine forth one hour, 10½ *momenta* and one-nineteenth part of one-half of a *momentum* before noon or midnight. Nonetheless, this numerical difference does not

45 I.e., a little to the south of due east, or the celestial equator.

46 That is, on account of the importance of finding the 14th day (= the full moon) of the first lunar month following the spring equinox. Medieval Christians believed that these were the criteria for determining the fourteenth day of the Jewish lunar month of Nisan, which is the beginning of Passover.

47 That is, 235 lunar months = 228 solar months or nineteen solar years.

apply to the established term of the year, be it embolismic or common, but is equally divided over nineteen **/596/** years. And thus over nineteen years, the appearance of the [new] moon, by running ahead of itself, deprives the final year of the nineteen-year cycle of one day, and causes it to be computed at 383 days.[48] If you neglect to do this, after 15 nineteen-year cycles the fifteenth moon will happen where you think the first should be.

The leap of the moon removes one night, but adds to the age [of the moon], which increases through the whole cycle. But in this leap the night which is removed is one which is counted before the moon wanes completely. In nature, of course, the night itself persists; this night marks the beginning of the following year and the starting point of the new cycle. For this reason, the final year retains an epact of 18, and it attaches 12, not 11 days to the first year.[49] And because the epacts come to an end in 30 days, no epact is placed at the beginning of the cycle.[50]

13. The Contents of the Paschal Cycle

This same Paschal cycle is assembled in eight columns.[51] The first column contains the years from the Incarnation of the Lord, increasing by one with each passing year. The second contains the Roman indictions, which always revolve in a cycle of fifteen years.[52] The third contains the eleven lunar epacts which accrete in each solar year according to the course of the moon, and which are always added [to the lunar regular[53] for each month] in order to find the age of the moon on the kalends of the month. They are positioned in reference to the 11th kalends of April [22 March]. The fourth column contains **/597/** the concurrent days of the week for the 9th kalends of April [24 March]; because of the loss [occasioned by] the leap-year day, they are

48 Rather than 384 days, the ordinary period of an embolismic lunar year (the nineteenth year of the cycle being embolismic).

49 On how the 'leap of the moon' affects the epacts in year one of the cycle, see Commentary.

50 This paragraph is printed at the end of *On Times* 13, by Giles, Migne, and Jones, which is where it appears in many MSS. Jones, *BOT*, p. 301, unnumbered note, points out that only three MSS 'place this passage at the end of Ch. XII, where it belongs according to content'. The three include **K**, and **Sg** should be added to these. Several MSS, including **S**, **V**, and **Z**, omit it entirely. Jones suggests that it probably began as a gloss.

51 Bede is referring to the graphic presentation of the Paschal table of Dionysius Exiguus, which organizes its data in eight columns. See the eight columns in the tables prepared by Wallis, *The Reckoning of Time*, Appendix 2, and also the cycles printed in PL 90, 825–78.

52 Since a cycle of fifteen years will not repeat from the beginning in a period of five hundred and thirty-two years, the indictions in Bede's tables apply only to the years 532–1063.

53 For the 'lunar regular' and how to derive it, see Wallis, *The Reckoning of Time*, pp. 295–96.

of necessity completed in twenty-eight years. Their calculation means that the 28 nineteen-year cycles have to be written out in such a way that each of the concurrents begins a single cycle, and that the grand total of the Paschal calculation is finished in five hundred thirty-two years. The fifth contains the lunar cycle, which the nineteen-year cycle precedes by three years, and which itself comprises nineteen years. The sixth contains the [dates of the] 14th days of the moon by which the men of old made the Pasch. These days are variably distributed between the 12th kalends of April [21 March] and the 14th kalends of May [18 April]; their new moons fall between the 8th ides of March [8 March] and the nones of April [5 April]. From the 14th moon to the 14th moon of the following year, there are 354 days if the year is common, and 384 if it is embolismic. In the seventh column are found the days of Easter of our Lord, from the 11th kalends of April [22 March] up to the 7th kalends of May [25 April] – the extreme prolongation being due to the calculation of the embolism. In the last column is found the moon on the feast of Easter, which varies between 15 and 21 because of [the position of] Sunday [with respect to the date of the 14th moon].[54] **/598/**

14. The Formulas for the Headings of the Paschal Table

If you want to find out the number of years from the Incarnation of the Lord, take cognizance of the number of indictional cycles – for example, by the fifth year of the Emperor Tiberius there had been 46.[55] Multiply these *by 15, and this makes* 690. *Always add twelve regulars*, because according to Dionysius **/599/** the Lord was born in the fourth indiction, and *add the indiction of the year you want*, *for example*, in the present year, one; *and this makes* 703. *These are the years of the Lord's* Nativity.[56]

If you want to know what the indiction is, take the years of the Lord and add three; divide by 15, and what remains *is the indiction* of the present year.[57]

If you wish to know *what the lunar epact is, divide the years of the Lord*

54 See Commentary.

55 Tiberius III Apsimar, ruler of the Eastern Roman Empire (698–705); the fifth year of Tiberius was AD 702. Forty-six indictional cycles of 15 years each total 690 years. Bede then adds 12 to account for the years between the birth of Christ (in AD 1 = indiction 4) and the beginning of the first post-Incarnation indictional cycle in AD 13; this brings the total to 702. The next year, AD 703, will therefore be the first of the indictional cycle.

56 Cf. Dionysius Exiguus, *Argumenta de titulis paschalis*, I (ed. Krusch, 2, 75). Bede must have composed this chapter in 703. See n. 55 below.

57 Dionysius Exiguus, *Argumenta* 2 (ed. Krusch, 2, 75). Left unstated is the observation that if the remainder is 0, the indiction is 15.

by 19 and *multiply* the remainder[58] *by 11; then divide by 30,* and *what is left over is* the epact.[59]

If you wish to know the concurrent days of the week, take the years of the Lord and add one-fourth of them; then *add four to these* because in the year of the birth of the Lord the concurrent was five; *divide these by seven, and what remains is the epact of the sun.*[60]

If you want to know what year of the nineteen-year *cycle it is, take the years of the Lord, and*, adding *one*, because the Lord was born in the second year of that cycle, *divide by 19*. The remainder is *the year* of the *nineteen-year* cycle.[61]

If you wish to know the number of the year of the lunar *cycle, take the years of the Lord, subtract two*, and divide *by 19*; what remains is the year of *the* lunar *cycle*.[62]

If you wish to know the *leap* year, *divide the years of the Lord by four*; what remains will be the number of years since the leap year.[63] When these are found, you can readily find the exact date of Easter and [the age of] its moon. If you want to find the epacts and concurrent days of the sun for any number of years from now – say, after one hundred Easters – it is only necessary to divide 100 by 19 and the remainder is 5; know that the epact one hundred years from now will be the same as it is five years from now.[64] In the same way, by dividing 100 by 28, you will find the solar concurrent one hundred years from now to be the same as the concurrent sixteen years from now.

15. The Sacrament of the Easter Season

Therefore Easter does not return on the same day of the year like the season of our Lord's Nativity. In the latter case only the memory of his birth **/600/**

58 *quod remanet*, **Sg**, *quod remanserit*, **BO**, Giles, Migne; *quod remanserint*, Jones.

59 Dionysius Exiguus, *Argumenta* 3 (ed. Krusch, 2, 75-76).

60 Dionysius Exiguus, *Argumenta* 4 (ed. Krusch, 2, 76). The solar epact is another term for the concurrent: see *The Reckoning of Time* 53. N.B., a remainder of 0 = a concurrent of 7.

61 Dionysius Exiguus, *Argumenta* 5 (ed. Krusch, 2, 76). This is the number of Dionysius' and Bede's nineteen-year cycle, not the lunar cycle which appears in column 5 of Bede's tables. A remainder of 0 = year nineteen.

62 Dionysius Exiguus, *Argumenta* 6 (ed. Krusch, 2, 76). Again, a remainder of 0 = year nineteen.

63 Dionysius Exiguus, *Argumenta* 8 (ed. Krusch, 2, 76–77).

64 That is, assuming you know the epacts for nineteen years into the future, you can calculate the lunar epact for any year beyond that by dividing the years from the present by 19, finding the remainder, and looking up the epact for the number of years into the future indicated by the remainder.

is held to be solemnized. But in the former case the mysteries of the life to come should be celebrated and its gifts received, and that is why Easter is called ‘Pasch’, which signifies the transition from death to life. Easter likewise seeks a season which corresponds to these mysteries: first, so that, with the equinox passed, the darkness of death may be conquered by the true Light; then, so that the joys of the new life may be celebrated in the first month of the year, which is called the month of the new [grain];[65] third, so that the Resurrection, which took place on the third day and was revealed in the third era of the world – that is, under grace,[66] since before the Law and under the Law it lay concealed within a prophetic enigma – might be celebrated in the third week of the moon,[67] since this very shift of phases of the moon at this time teaches the contemplative powers of the mind to exchange earthly things for heavenly glory; and finally so that the Lord’s day may be called to mind, a day made worthy of veneration through the creation of glorious light and through the triumph of Christ, and also a day which we should long for because of our own resurrection.

16. The Ages of the World[68]

Time is distributed into the six ages of the world. *The first age, from Adam to Noah*,[69] contains ten generations, and one thousand six hundred fifty-six years. This age perished completely *in the Flood*, *just as* infancy is wont to be submerged *in oblivion.*[70] *The second age from Noah to Abraham*[71] is likewise compounded of ten generations, but two hundred ninety-two years. This Age *is found with a language, that is, Hebrew, for humans begin* to know *how to speak in childhood after infancy* [***infa**ntia*], which derives its

65 *mensis nouorum*: cf. Exod. 23:15 and 34:18. See Kendall, *Bede: On Genesis*, p. 197, n. 307.

66 Referring to the tripartite division of the world-age: before the Law (Creation to Moses), under the Law (Moses to Christ), under grace (Christ to the present). See Wallis, *The Reckoning of Time*, p. 152, n. 91.

67 That is, Easter Sunday must fall within the week following the 14th day of the moon (14 Nisan). Since 14 Nisan can fall on any weekday, but Easter must fall on a Sunday, this allows for a range of seven days.

68 The major sources of this and the following chapters are Isidore’s ‘*Chronicon* B’, that is, his short chronicle in *Etym.* 5.38-39, and his *Chronica maiora*. Both are edited by Mommsen, MGH: AA 11 (*Chronica minora* 2), 424–81 – the *Chronica maiora* at the top of the page, and the *Etymologiae* chronicle at the foot. The Roman numerals indicate the paragraphs in Mommsen’s edition.

69 Isidore, *Chron.* B 3.

70 Augustine, *DCD* 16.43 (CCSL 48, 550.75-76).

71 Isidore, *Chron.* B 3.

name from the fact that it cannot 'talk' [***fa**ri*], that is, speak.[72] *The third* age *from Abraham to David*,[73] contains fourteen generations, and nine hundred forty-two years; and because *a human being can begin to generate from adolescence*, *Matthew* **/601/** *begins the generations from Abraham, who was also made the father of nations* [***gen**tium*].[74] *The fourth age from David until the transmigration* into Babylon[75] likewise extends for fourteen generations according to Matthew, and four hundred seventy-three years. Then *the time of the kings* began,[76] for the dignity of a man in the prime of life is appropriate for ruling. *The fifth age, up to our Lord's advent in the flesh*,[77] extends for fourteen generations, and five hundred eighty-nine years, and in it the Hebrew people, as if exhausted by the burden of old age, were battered by ever-increasing evils. *The sixth Age, which is unfolding now*,[78] has no fixed sequence of generations or times, but, like extreme dotage itself, will end in the death of the whole world-age.

17. The Sequence and Order of Times

So *the first age*[79] comprises one thousand six hundred and fifty-six years according to the Hebrews, and according to the Seventy Translators, two thousand two hundred forty-two years.[80] When he was one hundred and thirty *years old, Adam begat Seth*, *who was born in place of Abel*.[81] *When he was one hundred and five, Seth begat Enosh, who began to call upon the name of the Lord*.[82] *When he was ninety, Enosh begat Kenan*, [*whose name means 'the nature of God'*].[83] *When he was seventy, Kenan begat Mahalalel*, [which translated means '*the plantation* of the Lord'].[84] *When he was*

72 Augustine, *DCD* 16.43 (CCSL 48, 550.72-75).
73 Isidore, *Chron.* B 3.
74 Augustine, *DCD* 16.43 (CCSL 48, 550.65-70). Cf. Matt. 1:1-17.
75 Isidore, *Chron.* B 3.
76 Augustine, *DCD* 16.43 (CCSL 48, 550.58).
77 Isidore, *Chron.* B 3.
78 Isidore, *Chron.* B 3.
79 Isidore, *Chron.* B 4; *Chron. mai*. 2a.
80 Isidore gives the ages of the patriarchs according to the Septuagint: see following notes.
81 Isidore, *Chron.* B 5; *Chron. mai.* 4 (Isidore gives Adam's age as two hundred and thirty). Cf. Gen. 5:3.
82 Isidore, *Chron.* B 6; *Chron. mai.* 5 (Isidore gives Seth's age as two hundred and five). Cf. Gen. 4:26; 5:6.
83 Isidore, *Chron.* B 7; *Chron. mai*. 6 (bracketed phrase, **M** only, Mommsen/Jones; Isidore gives Enosh's age as one hundred and ninety).
84 Isidore, *Chron.* B 8; *Chron. mai.* 7 (bracketed phrase, **FMPSg** only, Giles, Migne, Mommsen/Jones; Isidore gives Kenan's age as one hundred and seventy). Cf. Gen. 5:12.

sixty-five*, Mahalalel begat Jared*, [*which translated means 'descending'* or 'carrying'].[85] *When he was* **/602/** *one hundred sixty-two, Jared begat Enoch, who was carried off by God*.[86] *When he was* sixty-five*, Enoch begat Methuselah*,[87] [which translated means '*dedication*'].[88] [*The sons of God lusted after the daughters of men*.][89] *When he was* one hundred and eighty-seven*, Methuselah begat Lamech*.[90] *The Giants were born*.[91] *When he was* one hundred and eighty-two*, Lamech begat Noah,* who *built the ark*.[92] *When Noah was six hundred years old, the Flood* arrived.[93]

18. The Second Age

The second age[94] comprises two hundred and ninety-two years according to the Hebrews, and according to the Seventy Translators nine hundred and forty-two, or if one adds in Kenan, one thousand and seventy-two years.[95] *In the second year after the Flood, Shem*, [when he was one hundred years old], *begat Arpachshad, from whom the Chaldeans are descended*.[96] *When he was* thirty-five*, Arpachshad begat Shelah, from whom the Samaritans and Indians are descended*.[97] *When he was* thirty*, Shelah begat Heber, from whom the Hebrews are descended*.[98] *When he was* thirty-four*, Heber begat*

85 Isidore, *Chron.* B 9; *Chron. mai.* 8 (bracketed phrase, **M** only, Mommsen/Jones; Isidore gives Mahalalel's age as 165). Cf. Gen. 5:15.

86 Isidore, *Chron.* B 10; *Chron. mai.* 9. Cf. Gen. 5:18.

87 Isidore, *Chron.* B 11; *Chron. mai.* 10 (Isidore gives Enoch's age as 165). Cf. Gen. 5:21.

88 Bracketed phrase, **M** only, Mommsen/Jones; the phrase is awkwardly interpolated, it refers not to Methuselah but to Enoch, cf. Jerome, *Liber interpretationis hebraicorum nominum* (CCSL 72, 65).

89 Bracketed phrase, **FPSg** only, Giles, Migne, Mommsen/Jones; Isidore, *Chron. mai.* 11. Cf. Gen. 6:2.

90 Isidore, *Chron.* B 12; *Chron. mai.* 12 (Isidore gives Methuselah's age as one hundred and sixty-seven). Cf. Gen. 5:25.

91 Isidore, *Chron. mai.* 13. Cf. Gen. 6:4.

92 Isidore, *Chron.* B 13; *Chron. mai.* 15 (Isidore gives Lamech's age as one hundred and eighty-eight). Cf. Gen. 5:28-29; 6:14-22.

93 Isidore, *Chron.* B 14; *Chron. mai.* 17. Cf. Gen. 7:6.

94 Isidore, *Chron.* B 15; *Chron. mai.* 18a.

95 The Septuagint adds Kenan between Arpachshad and Shelah (cf. Augustine, *DCD* 16.10 [CCSL 48, 512]), as Bede notes in *The Reckoning of Time* 66, AM 1693. Isidore omits this generation.

96 Isidore, *Chron.* B 16; *Chron. mai.* 19 (bracketed phrase, **EH**[2] only, Mommsen/Jones, and some MSS of Isidore). Cf. Gen. 11:10.

97 Isidore, *Chron.* B 17; *Chron. mai. 20* (Isidore gives Arpachshad's age as one hundred and thirty-five). Cf. Gen. 11:12.

98 Isidore, *Chron.* B 18; *Chron. mai.* 21 (Isidore gives Shelah's age as one hundred and thirty). Cf. Gen. 11:14.

Peleg. The Tower [of Babel] *was built*.[99] *When he was thirty, Peleg begat Reu. The gods were worshipped for the first time*.[100] *When he was* thirty-two*, Reu begat Serug. The kingdom of the Scythians was inaugurated.*[101] *When he was* thirty*, Serug begat Nahor. The kingdom of the Egyptians* **/603/** *came into being*.[102] *When he was* twenty-nine*, Nahor begat Terah. The kingdom of the Assyrians and the Sycinians began*.[103] *When he was seventy, Terah begat Abraham*.[104] *Semiramis built Babylon*.[105]

19. The Third Age

The third age[106] comprises nine hundred and forty-two years. [When he was seventy-five, Abraham came to Canaan.][107] *When he was one hundred, Abraham begat Isaac*. *But first he begat Ishmael, from whom the Ishmaelites are descended.*[108] *When he was sixty, Isaac begat Jacob*. *The kingdom of the Argives came into being*.[109] *When he was ninety, Jacob begat Joseph*.[110] *Memphis was founded in Egypt*.[111] *Joseph lived for one hundred and ten years*. *Under Argus, Greece began to cultivate fields*.[112] *The servitude of the Hebrews lasted* one hundred and forty-seven *years*.[113] *Cecrops built Athens*.[114]

99 Isidore, *Chron.* B 19; *Chron. mai.* 22 (Isidore gives Eber's age as one hundred and thirty-four). Cf. Gen. 11:16; 11:1-9.

100 Isidore, *Chron.* B 20–21; *Chron. mai.* 23–24 (Isidore gives Peleg's age as one hundred and thirty). Cf. Gen. 11:18.

101 Isidore, *Chron.* B 22–23; *Chron. mai.* 25–26 (Isidore gives Reu's age as one hundred and thirty-two). Cf. Gen. 11:20.

102 Isidore, *Chron.* B 24–25; *Chron. mai.* 27–28 (Isidore gives Serug's age as one hundred and thirty). Cf. Gen. 11:22.

103 Isidore, *Chron.* B 26–27; *Chron. mai.* 29–30 (Isidore gives Nahor's age as seventy-nine [or seventy-eight in *Chron.* B 26]). Cf. Gen. 11:24.

104 Isidore, *Chron.* B 28; *Chron. mai.* 31. Cf. Gen. 11:26.

105 Jerome, *Chron.* (ed. Helm, p. 20b, 26); Orosius 2.2.1 (CSEL 5, 82.2-3; Isidore, *Chron. mai*. 33.

106 Isidore, *Chron.* B 30; *Chron. mai.* 33a.

107 Bracketed sentence, **FPSg** only, Giles, Migne, Mommsen/Jones. Cf. Gen. 12:4-5.

108 Isidore, *Chron.* B 31; *Chron. mai.* 34. Cf. Gen. 16:15-16; 21:5.

109 Isidore, *Chron.* B 32–33; *Chron. mai.* 35–36. Cf. Gen. 25:25-26.

110 Isidore, *Chron.* 34; *Chron. mai.* 39. Cf. Gen. 30:23-24 (where Jacob's age is not mentioned).

111 Isidore, *Chron. mai.* 41.

112 Isidore, *Chron.* B 36–37; *Chron. mai.* 42–43. Cf. Gen. 50:25.

113 Isidore, *Chron.* B 38; *Chron. mai.* 44 (according to Isidore, one hundred and forty-four years).

114 Isidore, *Chron. mai*. 49.

Moses ruled Israel *for forty years*.[115] *Sparta was founded*.[116] *Joshua ruled for* twenty-six *years*.[117] The Judges held sway [for four hundred and five years] from Moses to the time of Samuel.[118] *Othniel ruled for forty years. Cadmus*, the king of Thebes, *invented the Greek alphabet*.[119] *Ehud ruled for eighty years*.[120] The musician *Amphion enjoyed renown*.[121] *Deborah ruled for forty years*.[122] Picus first reigned over the Latins.[123] *Gideon ruled for forty years*.[124] **/604/** The musicians *Orpheus and Linus* earned renown.[125] *Abimelech ruled for three years*.[126] *This man killed his seventy brothers*.[127] *Tola ruled for twenty-three years. Priam reigned over Troy. Jair ruled for twenty-two years*.[128] *Carmentis devised the Latin alphabet*.[129] *Jephthath ruled for six years. Hercules threw himself into the flames. Ibzan ruled for seven years*.[130] *The ten-year Trojan War broke out. Elon ruled for ten years*;[131] he is not found in the Septuagint. *Abdon ruled for eight years*.[132] *Aeneas arrived in Italy*.[133] *Samson ruled for twenty years. Ascanius founded Alba*.[134] [The book of Judges designates the times up to this point.][135] *Eli*

115 Isidore, *Chron.* B 40; *Chron. mai.* 54.

116 Isidore, *Chron. mai*. 57.

117 Isidore, *Chron.* B 42; *Chron. mai.* 59 (according to Isidore, twenty-seven years; Bede addresses the discrepancy in *The Reckoning of Time* 66, AM 2519). Cf. Josephus, *Ant.* 5.1.29 (ed. Blatt, p. 320.22).

118 Cf. Augustine, *DCD* 16.43 (CCSL 48, 549.41-57) (bracketed phrase, **Sg** ['395 or 405'], Giles, Migne; '305' **FP** only, Mommsen/Jones [Bede's own figures add up to four hundred and five]).

119 Isidore, *Chron.* B 44–45; *Chron. mai.* 61–62.

120 Isidore, *Chron.* B 46; *Chron. mai.* 65.

121 Isidore, *Chron. mai*. 63.

122 Isidore, *Chron.* B 48; *Chron. mai.* 73.

123 Isidore, *Chron. mai*. 76.

124 Isidore, *Chron.* B 50; *Chron. mai.* 77.

125 Isidore, *Chron. mai*. 79.

126 Isidore, *Chron.* B 52; *Chron. mai.* 81.

127 Isidore, *Chron. mai*. 82. Cf. Judges 9:5; 9:56.

128 Isidore, *Chron.* B 54–56; *Chron. mai.* 83–84; 86.

129 Isidore, *Chron.* B 57; *Chron. mai.* 97.

130 Isidore, *Chron.* B 58–60; *Chron. mai.* 89–90; 92.

131 Isidore, *Chron. mai.* 91; 93a. Cf. Judges 12:11.

132 Isidore, *Chron.* B 62; *Chron. mai*. 94. Cf. Judges 12:13-14.

133 Isidore, *Chron. mai*. 96.

134 Isidore, *Chron.* B 64–65; *Chron. mai*. 98–99. Cf. Judges 15:20; 16:31.

135 Bracketed sentence, **M** only, Mommsen/Jones. That is, the periods of rule of the 12 judges from Othniel to Samson. Othniel (forty), Ehud (eighty), Deborah (forty), Gideon (forty), Abimelech (three), Tola (twenty-three), Jair (twenty-two), Jephthath (six), Ibzan (seven), Elon (ten), Abdon (eight), Samson (twenty). Cf. *The Reckoning of Time* 66, AM 2818, where Bede

ruled for forty years.[136] *The kingdom of the Sycinians came to an end*.[137] *Samuel and Saul ruled for* thirty-two *years*.[138] *The kingdom of the Spartans arose*.[139]

20. The Fourth Age

The fourth age[140] comprises four hundred and seventy-three years according to the Hebrews; the Seventy Translators add on twelve. *David ruled for forty years*. *Carthage was founded by Dido.*[141] *Solomon reigned for forty years*;[142] he *constructed the Temple*[143] in the four hundred and eightieth year after the exodus from Egypt,[144] and from this it is plain **/605/** that Samuel and Saul held power for thirty-two years.[145] *Rehoboam reigned for seventeen years.*[146] *The kingdom of Israel and Judah was divided*.[147] *Abijah reigned for three years*.[148] *The priest Abimelech enjoyed fame*.[149] *Asa reigned for forty-one years*.[150] *Jehu* the prophet was killed by Asa [*i.e.,* Baasha] king of Israel.[151] *Jehoshaphat reigned for twenty-five years*. *Elijah, Obadiah and Micah* prophesied.[152] *Jehoram reigned for eight years*.[153] Edom defected from the

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specifies that the twelve judges governed for two hundred and ninety-nine years.

136 Isidore, *Chron.* B 66; *Chron. mai.* 101. Cf. 1 Kings/3 Kings 4:18.

137 Isidore, *Chron. mai.* 103.

138 Isidore, *Chron.* B 68; *Chron. mai.* 104 (Isidore says forty years). Cf. below n. 145, and *The Reckoning of Time* 66, AM 2790, 2870 and 2890.

139 Isidore, *Chron. mai*. 105.

140 Isidore, *Chron.* B 70; *Chron. mai.* 106a.

141 Isidore, *Chron.* B 71–72; *Chron. mai.* 107, 109.

142 Isidore, *Chron.* B 73; *Chron. mai.* 111.

143 Isidore, *Chron.* B 74; *Chron. mai.* 112.

144 Cf. 1 Kings/3 Kings 6:1; Bede, *De Templo* 1.393-451 (CCSL 119A, 157–58).

145 *xxxii annis*, **PSg** [*annis*, om. **Sg**]; *xxxii annis non xl*, **Giles, Migne**; *xl annis*, **FHM**, Mommsen/Jones. Bede can hardly have contradicted at this point his own statement at the end of the third age that Samuel and Saul ruled for thirty-two years. His figures confirm this: Moses, after the exodus, forty; Joshua twenty-six; the twelve Judges two hundred and ninety-nine (see above, n. 135); Eli forty; Samuel and Saul thirty-two; David forty; Solomon four. These total four hundred and eighty-one. See above, n. 138.

146 Isidore, *Chron.* B 75; *Chron. mai.* 113.

147 Isidore, *Chron.* B 76.

148 Isidore, *Chron.* B 77; *Chron. mai.* 117.

149 Isidore, *Chron. mai.* 118.

150 Isidore, *Chron.* B 79; *Chron. mai.* 119. Cf. 1 Kings/3 Kings 15:10.

151 1 Kings/3 Kings 16:7; cf. Isidore, *Chron.* B 80; *Chron. mai.* 120.

152 Isidore, *Chron.* B 81–82; *Chron. mai.* 121–22.

153 Isidore, *Chron.* B 83; *Chron. mai.* 123.

kingdom of Judah.[154] *Ahaziah reigned for one year*.[155] [*Jehonadab attained renown*.][156] *Elijah was carried off* [i.e., into heaven].[157] *Athaliah reigned for* six *years*.[158] *Jehonadab son of Rechab the priest attained renown*.[159] *Joash reigned for forty years*.[160] Zechariah, son of Jehoiada, was stoned to death.[161] *Amaziah reigned for twenty-nine years*.[162] Amos prophesied in Israel.[163] *Uzziah reigned for fifty-two years*.[164]

The kingdom of the Assyrians was transferred to the Medes;[165] [beginning with Belus], it had lasted one thousand three hundred and five years.[166] *Jotham reigned for sixteen years*.[167] *Hosea, Joel and Isaiah* prophesied.[168] *Ahaz reigned for sixteen years*.[169] *Rome was founded*,[170] and Israel *went into exile amongst the Medes*.[171] *Hezekiah reigned for twenty-nine years*.[172] *Romulus* appointed *one hundred senators*.[173] *Manasseh reigned for fifty-five years*.[174] *Numa added two months* [i.e., to the calendar].[175] *Amon reigned for* two *years*.[176] *Tullius conducted a census of the republic*.[177] *Josiah reigned*

154 Cf. 2 Kings/4 Kings 8:20.

155 Isidore, *Chron.* B 85; *Chron. mai.* 125. Cf. 2 Kings/4 Kings 8:26.

156 Bracketed sentence **M** only, Mommsen/Jones (an erroneous scribal insertion? see after Athaliah below). Isidore, *Chron.* B 88; *Chron. mai.* 128.

157 Isidore, *Chron.* B 86; *Chron. mai.* 126.

158 Isidore, *Chron.* B 87; *Chron. mai.* 127 (seven years according to Isidore = the Septuagint). Cf. 2 Chron./2 Para. 22:12.

159 Isidore, *Chron.* B 88; *Chron. mai.* 128. Cf. 2 Kings/4 Kings 10:15.

160 Isidore, *Chron.* B 89; *Chron. mai.* 130. Cf. 2 Kings/4 Kings 12:1 (Joash).

161 2 Chron./2 Para. 24:20-21; cf. Isidore, *Chron. mai*. 131.

162 Isidore, *Chron.* B 91; *Chron. mai.* 134.

163 Isidore, *Chron. mai.* 141.

164 Isidore, *Chron.* B 93; *Chron. mai.* 135. Cf. 2 Kings/4 Kings 15:1-2.

165 Isidore, *Chron. mai*. 137.

166 Compare to Bede's revised figure in *The Reckoning of Time* 66, AM 3192 (bracketed phrase, **FPSg** only, Giles, Migne, Mommsen/Jones).

167 Isidore, *Chron.* B 95; *Chron. mai.* 142.

168 Cf. Isidore, *Chron. mai*. 144.

169 Isidore, *Chron.* B 97; *Chron. mai.* 145.

170 Isidore, *Chron.* B 98; cf. *Chron. mai.* 146.

171 Cf. Isidore, *Chron. mai.* 147.

172 Isidore, *Chron.* B 99; *Chron. mai.* 148.

173 Isidore, *Chron. mai*. 150.

174 Isidore, *Chron.* B 101; *Chron. mai.* 151.

175 Isidore, *Chron. mai*. 152–53; Numa was credited with adding the months of January and February to the ten-month Roman calendar, cf. ch. 6 above, and *The Reckoning of Time* 12.

176 Isidore, *Chron.* B 103; *Chron. mai.* 155 (Isidore says twelve years; see also *The Reckoning of Time*, AM 3310, where Bede gives the Septuagint figure as twenty).

177 Isidore, *Chron. mai*. 156. Tullius Hostilius was reputedly the third king of Rome.

for thirty-one *years*.[178] *The natural philosopher Thales enjoyed renown*.[179] *Jehoiakim reigned for eleven years*.[180] *In the third year of his reign Nebuchadnezzar* **/606/** captured *Judea*.[181] *Zedekiah reigned for eleven years.*[182] *The Temple of Jerusalem was burnt*.[183]

21. The Fifth Age

The fifth age[184] comprises five hundred and eighty-nine years. *The captivity of the Hebrews lasted seventy years. The history of Judith was written down. Darius reigned for* thirty-six *years*.[185] *In the second year of his reign, the captivity of the Jews ended*.[186] *Xerxes reigned for twenty-one years*.[187] The *histor*ian *Herodotus gained recognition*.[188] *Artaxerxes reigned for forty years*.[189] *Ezra* restored *the Law and Nehemiah, Jerusalem*.[190] *Darius, who was also known as the Bastard,*[191] *reigned for nineteen years.*[192] *Plato was born*.[193] *Artaxerxes*[194] *reigned for forty years. The story of Esther was completed*.[195] *Artaxerxes, who also was known as Ochus,*[196] *reigned for twenty-six years*.[197] *Demosthenes and Aristotle declaimed in public*.[198] *Xerxes the son of Ochus*[199] *reigned for four*

178 Isidore, *Chron.* B 105; *Chron. mai.* 157. Thirty-two years according to Isidore (= the Septuagint).

179 Isidore, *Chron. mai*. 158.

180 Isidore, *Chron.* B 107; *Chron. mai.* 160.

181 Isidore, *Chron. mai*. 161.

182 Isidore, *Chron.* B 109; *Chron. mai.* 163.

183 Isidore, *Chron.* B 110; cf. *Chron. mai.* 164.

184 Isidore, *Chron.* B 111; *Chron. mai.* 166a.

185 Isidore, *Chron.* B 112–14; *Chron. mai.* 167–68; 170. Darius reigned for thirty-four years according to Isidore (= the Septuagint).

186 Isidore, *Chron.* B 115; *Chron. mai.* 171.

187 Isidore, *Chron.* B 116; *Chron. mai.* 173. Twenty years according to Isidore (= the Septuagint).

188 Isidore, *Chron. mai*. 175; cf. *Etym*. 1.42.2.

189 Isidore, *Chron.* B 118; *Chron. mai.* 176.

190 Isidore, *Chron.* B 119; *Chron. mai.* 177–78.

191 Darius II, the illegitimate son of Artaxerxes I.

192 Isidore, *Chron.* B 120; *Chron. mai.* 181.

193 Isidore, *Chron.* B 121; *Chron. mai.* 182.

194 Artaxerxes II.

195 Isidore, *Chron.* B 122–23; *Chron. mai.* 183–84.

196 Artaxerxes III.

197 Isidore, *Chron.* B 124; *Chron. mai.* 186.

198 Isidore, *Chron.* B 125; *Chron. mai.* 187–88.

199 Xerxes III (also known as Arses).

years. Xenocrates was famous.[200] *Darius*[201] *reigned for six years*.[202]

The kingdom of the Persians lasted up to this point; thereafter came the kingdom of the Greeks.[203] *Alexander reigned for five years*, *for the seven previous years of his reign are reckoned together* with *the Persian kings. Ptolemy the son of Largus reigned for forty years*.[204] *The first book of the Maccabees begins. [Ptolemy] Philadelphus reigned for thirty-eight years. The Seventy Translators won renown. [Ptolemy] Evergetes reigned for twenty-six years*. **/607/** *Jesus [son of Sirach] composed the book of Wisdom. [Ptolemy] Philopator reigned for seventeen years. The second book of the Maccabees* begins.[205] *[Ptolemy] Epiphanes reigned for twenty-four years. The Romans conquered the Greeks. [Ptolemy] Philometor reigned for thirty-five years*.[206] *Antiochus vanquished him and oppressed the Jews*.[207] *[Ptolemy] Evergetes reigned for twenty-nine years.*[208] *Brutus subjugated Spain.*[209] *[Ptolemy] Soter reigned for seventeen years*.[210] *Varro and Cicero were born*.[211] *Alexander reigned for ten years*. *Syria* was made *subject to the Romans by the general Gabinius*. *Ptolemy the son of Cleopatra reigned for eight years*.[212] *The historian Sallust was born*.[213] *[Ptolemy] Dionysius reigned for thirty years. Pompey took Judea. Cleopatra reigned for two years*.[214]

The kingdom of the Greeks lasted up to this point; thereafter came the empire of the Romans. *Julius Caesar*, *after whom the Caesars are named*, *ruled for five years*.[215]

200 Isidore, *Chron.* B 126–27; *Chron. mai.* 190–91.

201 Darius III (the son of Arsamus).

202 Isidore, *Chron.* B 128; *Chron. mai.* 192.

203 Isidore, *Chron. mai*. 194.

204 Isidore, *Chron.* B 130–31; *Chron. mai.* 195–96 (*Largus*, Isidore (some MSS), Bede; *Lagus* (correctly), Isidore (other MSS).

205 Isidore, *Chron.* B 132–38; *Chron. mai.* 199–201, 204–6, 210.

206 Isidore, *Chron.* B 139–41; *Chron. mai.* 209, 210a, 212.

207 Isidore, *Chron. mai*. 213.

208 Isidore, *Chron.* B 143; *Chron. mai.* 215.

209 Isidore, *Chron.* B 144; cf. *Chron. mai.* 216.

210 Isidore, *Chron.* B 145; *Chron. mai.* 217.

211 Isidore, *Chron. mai*. 218.

212 Isidore, *Chron.* B 147–49; *Chron. mai.* 220–21, 223. The chronology of the later Ptolemaic rulers of Egypt is confusing. Isidore's and Bede's figures frequently differ from those in modern works of reference.

213 Isidore, *Chron. mai*. 225.

214 Isidore, *Chron.* B 151–53; *Chron. mai.* 226–27, 232.

215 Isidore, *Chron.* B 155; *Chron. mai.* 233–34.

22. The Sixth Age

The sixth age[216] comprises, to date, seven hundred and three years.[217] *Octavian reigned for fifty-six years*.[218] *Our Lord was born in the forty-second year of his reign*,[219] when three thousand nine hundred and fifty-two (or according to others, five thousand one hundred and ninety-nine) years had passed since Adam.[220] [From the nativity of our Lord Jesus Christ to the reign of Tiberius there are fourteen years.][221] *Tiberius ruled for twenty-three years*.[222] *The Lord was crucified in the eighteenth year of his reign*.[223] *Gaius [Caligula] reigned for four years. Matthew wrote his Gospel. Claudius reigned for fourteen years*.[224] *Peter went to Rome*, and *Mark to* **/608/** *Alexandria*.[225] *Nero reigned for fourteen years. Peter and Paul* were handed over *to the cross* and *the sword*. *Vespasian reigned for ten years. In the second year of his reign, Titus destroyed Jerusalem. Titus reigned for two years;*[226] *he was eloquent and benevolent.*[227] *Domitian reigned for sixteen years. John was exiled to Patmos. Nerva reigned for one year*.[228] *On his return to Ephesus, the apostle John* composed *his Gospel*.[229] *Trajan reigned for nineteen years*.[230] *Simon, the bishop of Jerusalem,*[231] *was crucified, and the apostle John died*. *Hadrian*

216 Isidore, *Chron.* B 157; *Chron. mai.* 237a.

217 *dcciii*, **Sg**; dccviii, Giles, Migne; *dccviiii*, Mommsen/Jones. *On Times* was composed in 703 (see above, ch. 14, and below, ch. 22, n. 315; Jones, *BOT*, 130; Plummer, *BOH*, 1, cxlvi). The figures *dccviii* and *dccviiii* perhaps arose at the time the exemplars of some of our surviving manuscripts were copied. Makaso Ohashi has argued that the date was deliberately altered in Gaul to conform to Victorius of Aquitaine's chronology: '"*Sexta aetas continet annos praeteritos DCCVIIII*" (Bede, *De temporibus* 22): a Scribal Error?'. However, the comparable *annus praesens* in ch. 14 is not altered, even in these manuscripts. The change could have been introduced at Wearmouth-Jarrow itself, perhaps in the course of preparing a copy of *On Times* for bishop Acca at his accession in 710, for in that year, seven hundred and nine full years of the Sixth Age would have passed: we owe this suggestion to Peter Darby, University of Birmingham.

218 Isidore, *Chron.* B 158; *Chron. mai.* 235.

219 Isidore, *Chron. mai.* 237.

220 See Commentary.

221 Bracketed sentence **EHM** only, Mommsen/Jones.

222 Isidore, *Chron.* B 160; *Chron. mai.* 238.

223 Isidore, *Chron. mai*. 239.

224 Isidore, *Chron.* B 162–64; *Chron. mai.* 240, 242–43.

225 Isidore, *Chron. mai.* 244–45.

226 Isidore, *Chron.* B 166–170; *Chron. mai.* 246–47, 250–52.

227 Isidore, *Chron.* B 171.

228 Isidore, *Chron.* B 172–74; *Chron. mai.* 257, 259, 262.

229 Isidore, *Chron. mai.* 263.

230 Isidore, *Chron.* B 176; *Chron. mai.* 264.

231 See Introduction, pp. 13–14.

reigned for twenty-one years.[232] *The translator Aquila was held in high esteem.*[233] *Antoninus Pius reigned for twenty-two years* [and four months].[234] *Valentinus and Marcion enjoyed renown.*[235] *Antoninus the younger*[236] *reigned for* nineteen *years*.[237] *The heresy of the Cataphrygians arose.*[238] *Commodus reigned for thirteen years. The translator Theodotion was held in high esteem. Helius Pertinax reigned for one year*.[239] [He *was killed by the treason of the jurist Julianus*.][240] [Septimius] *Severus Pertinax reigned for eighteen years*.[241] *The translator Symmachus was held in high esteem*.[242] *Antoninus Caracalla reigned for seven years*. *A fifth version* [i.e., of the holy Scriptures] *was discovered in Jerusalem. Macrinus reigned for one year*.[243] [*Abgar, a holy man, reigned,*[244] *according to Africanus*.][245] *Aurelius Antoninus*[246] *reigned for* four *years*.[247] *A sixth version [of the Scriptures]* was found *at Nicopolis*.[248] *Alexander reigned for thirteen years*. *Origen enjoyed fame at Alexandria. Maximus reigned for three years*.[249] He *persecuted the* **/609/** *Christians*.[250]

232 Isidore, *Chron.* B 177–78; *Chron. mai.* 266–68.

233 Isidore, *Chron.* B 179; *Chron. mai.* 270. Aquila Ponticus translated the Old Testament from Hebrew into Greek.

234 Isidore, *Chron.* B 180; *Chron. mai.* 272 (bracketed phrase, Giles, Migne; mens. iii, **FP** only, Mommsen/Jones).

235 Isidore, *Chron.* B 181; *Chron. mai.* 274.

236 Marcus Aurelius (Marcus Antoninus Verus).

237 Isidore, *Chron.* B 182; *Chron. mai.* 276 (eighteen years according to Isidore).

238 Isidore, *Chron.* B 183; *Chron. mai.* 277. The Cataphrygians were followers of the second-century heresiarch Montanus.

239 Isidore, *Chron.* B 184–86; *Chron. mai.* 278–79, 281.

240 Bracketed sentence **M** only, Mommsen/Jones. Jerome, *Chron*. (ed. Helm, p. 210.16-17); Orosius 7.16.5-6 (CSEL 5, 473.16). Pertinax was succeeded by Didius Julianus. See *The Reckoning of Time* 66, AM 4146. The notion that Julianus was a lawyer may result from confusion with the famed jurist Salvius Julianus.

241 Isidore, *Chron.* B 188; *Chron. mai.* 283.

242 Isidore, *Chron.* B 189; *Chron. mai.* 284. Symmachus translated the Old Testament into Greek.

243 Isidore, *Chron.* B 190–92; *Chron. mai.* 288–90.

244 At Edessa.

245 Bracketed sentence **M** only, Mommsen/Jones. Isidore, *Chron. mai.* 290b. Africanus is Julius Africanus, the chronographer and historian (AD 170?–240?).

246 Marcus Aurelius Antoninus, better known as Heliogabalus.

247 Isidore, *Chron.* B 194; *Chron. mai.* 291 (Isidore gives the years of Heliogabalus as three; Bede follows Jerome in making them four).

248 Isidore, *Chron. mai.* 292.

249 Isidore, *Chron.* B 196–98; *Chron. mai.* 294–95, 297. Maximus = Maximinus Thrax.

250 Isidore, *Chron. mai.* 299.

Gordian reigned for seven years.[251] *Fabian* was honoured *as bishop of Rome*.[252] *Philip reigned for seven years.*[253] *He was the first Christian emperor.*[254] *Decius reigned for one year.*[255] *Antony the monk was famous* [in Egypt].[256] *Gallus and Volusianus reigned for two years*. The Novatianist *heresy* emerged. *Valerian reigned with Gallienus for fifteen years*. *Cyprian won the crown of martyrdom. Claudius reigned for two years*.[257] *Paul of Samosata* launched a heresy.[258] *Aurelian reigned for five years. He persecuted the Christians. Tacitus reigned for one year*.[259] [*Bishop Anatolius* of *Laodicea* in Syria enjoyed renown.][260] *Probus reigned for six years. The Manichean heresy arose. Carus reigned for two years. He triumphed over the Persians*. *Diocletian and Maximian reigned for twenty years*.[261] Under these persecutors, 17,000 people died within 30 days.[262] Valerius[263] *reigned for two years*.[264] [*The short span of this reign furnished nothing worthy of historical record*.][265] *Constantine reigned for thirty years. The Council of Nicaea was convened. Constantius and Constans reigned for twenty-four years*.[266] *The bones of Andrew and Luke were translated to Constantinople*.[267] *Julian reigned for two years. Having reverted to paganism from Christianity, he persecuted the Christians. Jovian reigned for one year. Together with his entire army, he converted to Christianity. Valentinian reigned for*

251 Isidore, *Chron.* B 200; *Chron. mai.* 300.

252 Cf. Isidore, *Chron. mai.* 301, where the pope is called Flavian.

253 Isidore, *Chron.* B 202; *Chron. mai.* 302.

254 Isidore, *Chron.* B 203; *Chron. mai.* 303. The claim that Philip (emperor 244–249) was Christian originates with Eusebius, but is certainly false.

255 Isidore, *Chron.* B 204; *Chron. mai.* 305.

256 Isidore, *Chron.* B 205; *Chron. mai.* 306 (bracketed phrase, **M** only, Mommsen/Jones).

257 Isidore, *Chron.* B 206–10; *Chron. mai.* 307–10, 313.

258 Isidore, *Chron. mai.* 315.

259 Isidore, *Chron.* B 212–14; *Chron. mai.* 316–18.

260 Bracketed sentence **M** only, Mommsen/Jones. Cf. Jerome, *Chron.* (ed. Helm, pp. 223.21-22).

261 Isidore, *Chron.* B 215-19; *Chron. mai.* 320-24.

262 *his persecutoribus … passi sunt*, **EHM**, Mommsen/Jones; *his … christianorum patiuntur*, **Sg**: *Liber pontificalis* 30 (ed. Duschesne, 1, 162); iste persequitur christianos, **FP**, Giles, Migne.

263 *Valerius*, **MSg**; *Valerianus*, **EH**, Mommsen/Jones; Maximinus Severusque, Giles, Migne. The reference is to Galerius Valerius Maximianus (305–311).

264 Isidore, *Chron.* B 221; *Chron. mai.* 327 (*Galerius*).

265 Bracketed sentence **M** only, Mommsen/Jones. Isidore, *Chron. mai.* 328.

266 Isidore, *Chron.* B 222–24; *Chron. mai.* 329, 331, 335.

267 Isidore, *Chron. mai.* 342.

fourteen years.[268] He had been *deprived of his military command* by Julian **/610/** on account of his faith in Christ.[269] *Gratian reigned for six years*.[270] *The bishops Ambrose and Martin enjoyed renown*.[271] [Valens reigned for three years.][272] *Valentinian*[273] *reigned with Theodosius for nine years. Jerome preached in Bethlehem*.[274] [*There was a council of* 350 *bishops in Constantinople, at which all the heresies were condemned*.][275] *Theodosius, with Arcadius and Honorius, reigned for three years. John the Anchorite enjoyed renown. Arcadius, together with his brother Honorius, reigned for thirteen years*.[276] The bishops *John Chrysostom* and *Augustine preached*.[277] *Honorius, with Theodosius II, reigned for fifteen years*.[278] *Cyril of Alexandria* enjoyed renown.[279] [A Council of 214 bishops at Carthage condemned Pelagius.][280] *Theodosius II reigned for* twenty-six *years*.[281] *The Council of Ephesus condemned Nestorius*.[282] *Marcian reigned for seven years*.[283] *The Council of Chalcedon was held*.[284] [The English people arrived in Britain.][285] *Leo I reigned for seventeen years.*[286] *Egypt was in an uproar over the error of Dioscorus*.[287] [Leo II reigned for one year. Theodoric the king took Rome.][288] *Zeno reigned for seventeen years*.[289] *The body of the apostle Barnabas was found*.[290] *Anastasius reigned for twenty-seven years.*[291] *Bishop Fulgentius*

268 Isidore, *Chron.* B 226–30; *Chron. mai.* 343–44, 346–48.
269 Augustine, *DCD* 18.52 (CCSL 49, 651).
270 Isidore, *Chron.* B 232; *Chron. mai.* 353.
271 Isidore, *Chron. mai.* 353, 355.
272 Bracketed sentence **P** only, Mommsen/Jones.
273 Valentinian II.
274 Isidore, *Chron.* B 234–35; *Chron. mai.* 356, 358.
275 Bracketed sentence **EHMSg** only, Mommsen/Jones. Isidore, *Chron. mai.* 357.
276 Isidore, *Chron.* B 236–38; *Chron. mai.* 362–63, 365.
277 Cf. Isidore, *Chron.* B 239, 241; *Chron. mai.* 369–70.
278 Isidore, *Chron.* B 240; *Chron. mai.* 371.
279 Isidore, *Chron. mai.* 375.
280 Bracketed sentence **EHMSg** only, Mommsen/Jones. Cf. Isidore, *Chron. mai.* 374.
281 Isidore, *Chron.* B 242; *Chron. mai.* 376 (twenty-seven years according to Isidore).
282 Isidore, *Chron. mai.* 378.
283 Isidore, *Chron.* B 244; *Chron. mai.* 380 (six years according to Isidore).
284 Isidore, *Chron.* B 245; *Chron. mai.* 381.
285 Bracketed sentence **EHM** only, Mommsen/Jones.
286 Isidore, *Chron.* B 246; *Chron. mai.* 383.
287 Isidore, *Chron.* B 247; *Chron. mai.* 384.
288 Bracketed sentence **EHM** only, Mommsen/Jones.
289 Isidore, *Chron.* B 248; *Chron. mai.* 386.
290 Isidore, *Chron. mai.* 388.
291 Isidore, *Chron.* B 250; *Chron. mai.* 389.

preached.[292] *Justin reigned for eight years. The heresy of the Acephali was put down*.[293] [*Abbot Benedict enjoyed renown*.][294] *Justinian reigned for thirty-nine years*.[295] The first cycle of Dionysius begins in the sixth year of his reign.[296] *Justin II reigned for eleven years*. *The Armenians received the faith of Christ. Tiberius reigned for* **/611/** *seven years*.[297] Herminigild, the king of the Goths, won the crown of martyrdom.[298] *Maurice reigned for twenty-one years*.[299] *Gregory, the bishop of Rome*, flourished.[300] *Phocas reigned for eight years*.[301] The Saxons in Britain received the faith of Christ. *Heraclius reigned* for thirty-six years.[302] *The Jews in Spain were compelled to become Christians*.[303] Heracleonas with his mother Martina reigned for two years.[304] [At this time, the heresy of the Acephali was renewed.][305] Constantine, the son of Heraclius, reigned for six months. [At this time, this same heresy of the Acephali was condemned by an anathema.][306] Constantine,[307] the son of Constantine, reigned for twenty-eight years. An eclipse of the

292 Isidore, *Chron.* B 251; cf. *Chron. mai.* 391.

293 Isidore, *Chron.* B 252–53; *Chron. mai.* 394–94a.

294 Bracketed sentence **EHM** only, Mommsen/Jones. Isidore, *Chron. mai.* 399c.

295 Isidore, *Chron.* B 254; *Chron. mai.* 397.

296 I.e., the first nineteen-year cycle of Dionysius Exiguus, which begins in AD 532. In Krusch's edition of Dionysius's prologue (Krusch, 2, 64), Dionysius explains that he has (a) translated Cyril of Alexandria's table into Latin, and there are six years still to go in that table, and (b) constructed a ninety-five-year extension of Cyril's table, beginning in the year of Diocletian 248, i.e. AD 532. Justinian came to the throne in 527, so Bede is correct that Dionysius's first complete cycle begins in the sixth year of the emperor's reign. However, the tables were composed in 525, when the Cyrillian table still had six years to run. At the end of the prologue (p. 68) Dionysius says that in the present year the indiction is three, the year of the nineteen-year cycle is 13 and the year of the lunar cycle is 10, in the consulship of Probus the Younger, which corresponds to 525.

297 Isidore, *Chron.* B 256–58; *Chron. mai.* 401, 401b, 404.

298 Cf. Gregory, *Dialogues* 3.31 (ed. de Vogüé, Sources chrétiennes 260, pp. 384–89).

299 Isidore, *Chron.* B 260; *Chron. mai.* 406.

300 Isidore, *Chron. mai.* 408b.

301 Isidore, *Chron. mai.* 410; cf. *Chron.* B 262 (which states that he reigned for seven years).

302 Cf. Isidore, *Chron.* B 264; *Chron. mai.* 414. The manuscripts of *DT* are not in accord on the number of years of Heraclius's reign; see *The Reckoning of Time* 66, AM 4591, where Bede gives the years as twenty-five.

303 Isidore, *Chron.* B 265; cf. *Chron. mai.* 416.

304 *Adnotationes antiquiores ad cyclos Dionysianos*, ed. Mommsen, MGH: AA 9.1, p. 753 [but there is no reference to Martina here].

305 Bracketed sentence **M** only, Mommsen/Jones.

306 Bracketed sentence **M** only, Mommsen/Jones.

307 Constans II.

sun took place in the seventh indiction, on the 5th nones of May [3 May].[308] Constantine,[309] the son of the previous Constantine reigned for seventeen years. He summoned the Sixth [Ecumenical] Council.[310] Justinian, the son of Constantine, reigned for ten years.[311] [Because of his criminal perfidy he was deposed and sent into exile.][312] Africa was restored to the Roman empire. Leo[313] reigned for three years. At present, Tiberius[314] has reigned for five years, and it is the first indiction.[315] The rest *of the sixth age* is known *to God alone*.[316]

308 Cf. *The Reckoning of Time*, AM 4622; *EH* 3.27. The eclipse actually took place on 1 May 664; see Wallis, *The Reckoning of Time*, commentary on ch. 43.

309 Constantine IV.

310 *Liber Pontificalis* 82.2 (ed. Duschesne, 1, 359). This was the Third Council of Constantinople, 680–681.

311 Justinian II was deposed after ten years of rule in 685, but regained the throne in 705.

312 Bracketed sentence **M** only, Mommsen/Jones.

313 Leontius.

314 Tiberius III Apsimar (emperor 698–705).

315 AD 703.

316 Isidore, *Chron.* B 266; cf. *Chron. mai.* 418.



COMMENTARIES

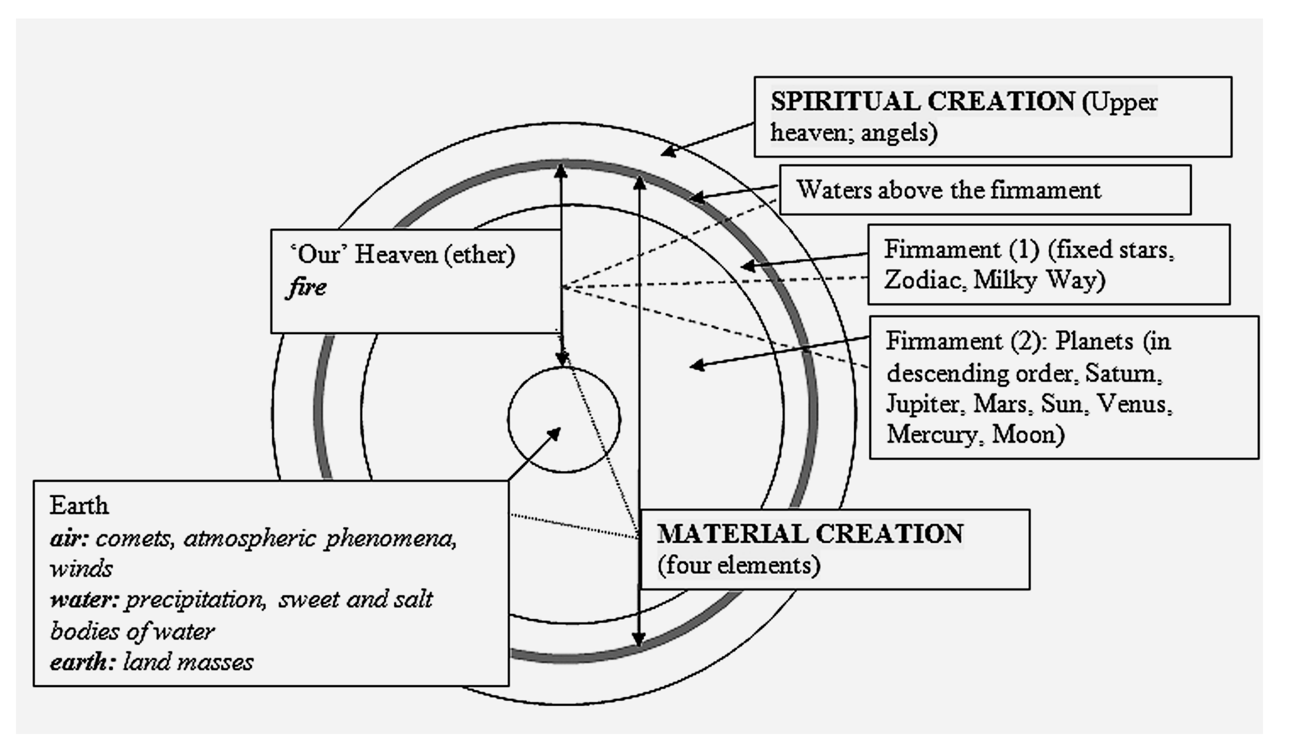


Figure 1 Schematic model of Bede's cosmos

COMMENTARY: *ON THE NATURE OF THINGS (ONT)*

ONT, Verse epigraph

Like two other of Bede's earliest works, his *Commentary on the Apocalypse* and *On the Holy Places*, *On the Nature of Things* is prefaced by a verse epigraph. The epigraph is curious, in that it suggests that the 'brief chapters' to follow will deal with both the 'natures of things' and the 'broad ages of fleeting time'. In fact, *ONT* does not deal with the world-ages, though *OT* certainly does. One solution would be that Bede composed the two works together, and intended them as companion-texts. But if this was the case, why did he not follow Isidore, his principal source, by keeping cosmography and chronology within the same covers? He did, to be sure, re-unite them in *The Reckoning of Time* (his preface to this work mentions them in the same breath) but on rather different terms, namely with the cosmography selected and integrated into the computistical framework. In sum, the contents of the epigraph seem to point to some conceptual unity between *ONT* and *OT*, while retaining separate vocational identities for the two works. See Introduction, pp. 4–5.

ONT, Chapter 1: The Fourfold Work of God

From the opening chapter of *ONT*, Bede telegraphs his intentions with regard to the book that is at once his model, and the rival he intends to surpass: Isidore's *De natura rerum*. Where Isidore, in the conventional manner of a classical school-cosmography, begins his cosmography (following eight introductory chapters on time) with the *universe*, Bede begins with *creation.* Isidore, to be sure, remarks that the subject of the first chapter of *DNR,* the day, happens to be almost the first visible thing created by God, but this is a pious aside, without structural significance for the work as a whole. In 'The Fourfold Work of God' Bede, leaning heavily on the thought of Augustine, establishes God's many-layered creative action as the foundation of the material universe. Creation understood as divine *operatio* or activity, operates in four dimensions or on four levels. In the dispensation of the Second Person of the Trinity, the eternal Word by which all things were made, one can say that

God's creation exists eternally. Secondly, there are the elements co-created with primordial matter; and in that sense, God made all that he made instantaneously. Thirdly, there was the creation described in Genesis, when the causes, created all together and all at once, acted in temporal sequence to differentiate the elements into the contents of the material world. Finally, God's work of creation continues in the form of his governance of the universe. The creative causes now operate to reproduce and replenish life, a theme developed in chapter 2. In sum, Bede does not begin his account of the universe with the universe itself, for to do so would imply that the cosmos is self-sufficient and eternal. Instead, he begins with the cause – or rather, the layered causality – that brings the world into being. He does not begin with the sequential narrative of Genesis, but with the wider metaphysical and theological context of creation itself as a divine action. The elements are not parts of the world, but properties of the matter from which God makes the world; the world is not self-existent, but encompassed by causes which direct its formation and assure its continued existence.[1] He revisits this theme in chapter 5 of *The Reckoning of Time*, where he says that some Fathers claim that the initial simultaneous creation was a creation of 'a single seedbed material (*seminaria … materies*)', an idea derived from Augustine's *De Genesi ad litteram* (*The Literal Interpretation of Genesis*).[2] It is therefore noteworthy that Bede's commentary *On Genesis* does not so distinguish the levels of divine creative action. To be sure, Bede does stress that heaven and earth are created at one and the same time, even though human speech must perforce name the creation of earth after that of heaven,[3] and he explains that though the Bible mentions the creation of earth and the waters together in Genesis 1:1-2, one may take the other two elements to be implicitly present.[4] He also observes that the plants were created on the third day instantaneously in full springtime bloom, just as the first man was created an adult,[5] and that all the genera of animals came into being instantly, even though the Bible refers to them one after another.[6] But there is no hint here of pre-existing causes.

Bede's chapter is based on Augustine's enumeration of four kinds of creation, (1) the pre-existence of all things in the mind of God, (2) all matter, (3) living things, (4) the offspring of living things:

1 See Wallis, 'Bede and Science'.

2 See in particular Augustine, *DGAL* 5.23 (CSEL 28.1, 167–69) and 6.10 (CSEL 28.1, 182–83). Bede quotes from *DGAL* in this chapter, and it was a foundational text for his *On Genesis*.

3 *On Genesis* 1.1:1, trans. Kendall, p. 68.

4 *On Genesis* 1.1:2a/b, trans. Kendall, pp. 70–71.

5 *On Genesis* 1.1:11-13, trans. Kendall, pp. 79–80.

6 *On Genesis* 1.1:25a/b, trans. Kendall, p. 89.

> But these things [i.e., all things that are, including space and time, and spiritual and material objects] exist (1) one way in the Word of God, where they were not made, but are eternal; (2) another way in the elements of the world, where everything that will be was made at once; (3) another way in things that are created partly from existing causes, and partly from causes not yet existing, but each of them severally coming into existence at its own appointed time, among which can be cited Adam, who was already formed from mud, but was also brought to life by the breath of God, like the risen grass [cf. Isa. 40:6]; and (4) another way in seeds, in which primordial things are repeated, as it were, led from things which existed from things that he created first, like the plant from the earth, the seed from the plant.[7]

Bede retains Augustine's four categories, but in accordance with his own interests puts the emphasis in (4) on *time* as the matrix of reproduction.

***ONT*, Chapter 2: The Formation of the World**

Bede's statement that on the seventh day God rested from the work of creation, but not from the governance (*gubernatio*) of creation – an idea which re-appears in a similar context and with identical terminology in *On Genesis*[8] – has no traceable source. However it bears a striking resemblance to the notion of providence as extended creation in Augustinus Hibernicus's *De mirabilibus sacrae scripturae* (*On the Marvels of Holy Scripture*):

> But we must consider more carefully how the same God can be considered to have finished then, and to be working now. On the sixth day he completed his work on the natures of created things, but even now he does not cease to govern them; and on the seventh day he rested from the work of creation (*ab opere creationis*), but he never ceases from the exercise of government (*a gubernationis regimine*). For we are to understand that God was a creator then (*tunc … Creator*), but is a Governor now (*nunc Gubernator*). Therefore if among created things we see anything new arise, God should not be thought to have created a new nature, when he is only bringing forth from the hidden depths of its [existing] nature that which lay concealed within.[9]

While there is no direct evidence that Bede knew this work (though he definitely used other Irish cosmographical texts), this passage constitutes a significant piece of circumstantial evidence pointing in this direction.

7 Augustine, *DGAL* 6.10 (CSEL 28.1, 182.18–183.1) (trans. Kendall).

8 *In Gen.*, ed. Jones, 35.1088-1092; *On Genesis* 1.2:3a/b, trans. Kendall, p. 100.

9 Trans. Carey, *King of Mysteries*, pp. 52–53; original text in PL 35.2151-2152. See Carey, *A Single Ray of the Sun*, ch. 2.

***ONT*, Chapter 3: What the World Is**

Only in chapter 3 when the status of the created world is clarified does Bede turn from the act of creation to creation as the product of that act. Now he can pick up Isidore's definition of the universe and transform it with the help of Pliny's *Natural History*, notably by introducing the concept of the elements as the constituents of the universe.

***ONT*, Chapter 4: The Elements**

Pliny's definition of the world as the four elements actually constitutes Bede's plan for *ONT*, giving it a distinctive structure that sets it apart from Isidore's work. The four elements determine not only the qualities of material entities but also their location according to relative weight. Fire is the lightest element, and naturally moves to the highest place; earth is the heaviest, and will always seek the lowest position. Air is heavier than fire but lighter than water, while water is heavier than air but lighter than earth. Hence the elements define four vertically arranged realms in the material cosmos. Bede will arrange his text as a top-to-bottom survey of these realms: the heavens (fire, chs. 5–23), the atmosphere (air, chs. 24–37), the waters upon the earth (chs. 38–43) and the features of the earth itself (chs. 44–51). The idea of the elements as a vertical chain binding heaven and earth goes back to the roots of this schema in Plato's *Timaeus* 31B–32B, but Bede's immediate source was an Irish cosmography, the pseudo-Isidore's *Liber de ordine creaturarum* (*The Book on the Order of Creatures*). In *On Genesis*, Bede will link this vertical order to the sequence by which the cosmos is 'adorned' from the fourth to the sixth days of creation.[10]

The general statement that air rises above water is in his source, but Bede adds the detail about air and water in a vessel, which suggests some kind of simple experiment, like blowing air through a hollow reed into a vessel of water and observing the bubbles rising to the surface.

***ONT*, Chapter 5: The Firmament**

The term *firmamentum* to denote the sky 'fixed' above the earth is a purely Biblical one, unknown to classical science. Bede uses the classical term *coelum* in this chapter, but the chapter heading implies, without going into detail or arguing the point, that he understood the firmament created by God on the second day as identical with the celestial sphere of the ancients. His doctrine on the celestial realm is also strictly classical: it is the realm

10 *On Genesis* 1.1:14a/b, trans. Kendall, p. 80.

of the element fire; it is a perfect sphere; it revolves once each day on its axis, which passes through the north and south poles of the Earth. Bede may be thinking of the terrestrial extremities of the axis when he refers to the wasting cold. The casual equation of the southern hemisphere with ‘the chambers of the south’ of Job 9:9 is typical of the oblique manner in which Bede connects cosmology with Christian learning. Unlike Isidore and some of the Irish writers of the seventh century, he does not spell out allegories or seek to explain the miracles or mysteries of Scripture. Rather, he glances sidewise from time to time at the sacred text.

Notice Bede’s use of the term *sapientes mundi*, ‘those who are knowledgeable about the world’. This seems to be a way of avoiding the term *philosophi*, which had negative overtones for Bede. Indeed, in his Biblical commentaries he equates *philosophi* with heretics.[11]

ONT, Chapter 6: The Varied Height of Heaven

This chapter, a quotation from Pliny, elaborates on the spherical shape of the cosmos. The stars which rotate around the North Pole, particularly the Great Bear and Little Bear (or Big and Little Dipper) seem to be ‘higher up’ in the sky – that is, closer to the zenith – in higher latitudes than in lower ones. Likewise, the constellations further away from the North Pole will move towards the zenith the further one travels to the south, and new constellations invisible to northerners because of the intervening bulge of the planet will come into view. Bede is particularly interested in the issue of the sphericity of the universe and of planet Earth (see ch. 46 below).

As Wallis has argued elsewhere, Bede also saw the structure of the universe in vividly architectural terms, but successfully merged this with a rigorously spherical model of the physical cosmos.[12] We can, perhaps, speculate that Bede’s way of imaging the perfection of heaven and eternity had something to do with circularity, which is why the endless circle of the Paschal cycle was such a powerful allegory of the world to come.

ONT, Chapter 7: Upper Heaven

In his commentary *On Genesis*, Bede observes that the ‘heaven’ whose simultaneous creation with ‘earth’ is recorded in Genesis 1:1 is the *upper* heaven, the abode of the angels (who were themselves created in the instant that upper heaven was created) and of God himself. It is not the heaven of

11 Bede, *In primam partem Samuhelis* 4.31.1; *In Ezram et Neemiam* 1, lines 1883–94. See Brown, *A Companion to Bede*, p. 20 and nn. 12–13.

12 Wallis, ‘Caedmon’s Created World and the Monastic Encyclopedia’.

the stars and planets,[13] which he calls 'our heaven'[14] or the 'ether'.[15] Upper heaven is an invisible spiritual realm, illuminated by a perpetual and invariable light which existed before the creation of material light.[16] It is separated from the astronomical heavens by the 'waters above the firmament' (see ch. 8), and so is not part of the elemental zone of fire. The angels who inhabit this heaven are also immaterial, though they can assume bodies of such materiality that they can eat like men – a point discussed in some detail both in *On Genesis* 1 and in *On Genesis* 4 in the context of Abraham's and Lot's hospitality to the angels.[17]

ONT, Chapter 8: The Heavenly Waters

In *On Genesis*, Bede explains that the reference to the abyss (Genesis 1:2) implies that God created waters along with heaven and earth, even before he created light.[18] Water and earth in that sense were the first elements to be created. The essentially 'secular' vocation of *ONT* is nowhere so clearly illustrated as in this chapter, where Bede not only sets aside the historical narrative of creation, but sidesteps one of the most vexatious questions of Christian cosmology, namely, how to account for the existence of the 'waters above the firmament' of Genesis 1:7. In *On Genesis*, Bede was ready to meet this question head on. There he explained, with support from Augustine and Ambrose, that the waters above the firmament are actually solid – crystallized like quartz. Hence there is no need to be anxious that they would ever fall down. Moreover, like clouds that sail along in the air, these heavenly waters can remain aloft on the foundation of firmer elements below them.[19] Here, on the other hand, Bede focuses on a totally different question – one which he would, interestingly, explicitly avoid in *On Genesis.* The waters are simply assumed to exist, and their nature is not discussed. But what is their *purpose*?[20] The Irish pseudo-Isidore offers a naturalistic explanation: they were not a reservoir for the Flood, but a buffer to cool the intense heat of the heavenly bodies.

13 *On Genesis* 1.1:2a/b, trans. Kendall, pp. 69–70.
14 *On Genesis* 1.1:2a/b; 1.1:6-8, trans. Kendall, pp. 69 and 75.
15 *On Genesis* 1.1:21a/d, trans. Kendall, pp. 86–87.
16 *On Genesis* 1.1:2c, trans. Kendall, pp. 72–73.
17 *On Genesis* 1.1:29-30c; 4.18:2-3, trans. Kendall, pp. 95, 290–91.
18 *On Genesis* 1.1:2a/b, trans. Kendall, p. 70.
19 *On Genesis* 1.1:6-8, trans. Kendall, p. 76.
20 In *On Genesis* 1.1:6-8, trans. Kendall, p. 76, Bede bypasses the question of the purpose of these waters by asserting that it is something known to God alone.

ONT, Chapter 9: The Five Circles of the World

This chapter unfolds in a very matter-of-fact manner, but contains some potential sources of misunderstanding. Bede and his sources carefully distinguish between the divisions of the spherical universe into five zones, which projected onto the earth become five regions (the subject of this chapter), and the division of the inhabited lands of the earth into three continents (the subject of ch. 51). This distinction is reflected in two types of world-map: the zonal schema transmitted principally through Macrobius, and the T-O map, a presumably classical form that became attached to some manuscripts of Isidore of Seville's *De natura rerum.*[21] While the T-O map represents the inhabited territories of the world as a disc of land encircled by a ribbon of ocean (see Commentary on ch. 51 below), the zonal map illustrates the globe in its entirety. Sometimes the two forms are combined, with the map of the inhabited continents inserted into the northern temperate zone.[22]

In the discussion in this chapter there are five circles and five regions. The Latin *circulus* may refer to either. The circles are the northern (the Arctic Circle, 66°33'N), the summer solstitial (the Tropic of Cancer, 23°27'N), the equinoctial (the equator, 0°), the winter solstitial (the Tropic of Capricorn, 23°27'S), and the southern (the Antarctic Circle, 66°33'S). These circles are conceived as imaginary lines on the Earth's surface (= parallels of latitude) or as projected upon the heavenly sphere. The same terms describe the five regions marked off by these circles: the North Frigid zone, the North Temperate zone, the Torrid zone, the South Temperate zone, and the South Frigid zone. However, it is important to bear in mind that Bede is still discussing the heavens. He is thus interested in the zones as markers of the annual passage of the sun through the seasons, as well as their implications for the climates of the earth. When this material was expanded in *On the Reckoning of Time* 34, this link between geography and time-reckoning would be made more explicit.

Bede describes the southern zone between the Tropic of Capricorn and the Antarctic Circle as 'temperate and habitable' without qualification, and this may have provoked some questions, or even criticisms, from his readers. In *The Reckoning of Time* 34, Bede will explain at some length that though this zone is theoretically habitable, it is inconceivable that it should actually be inhabited. His principal argument is from Pliny: the two

21 See Teresi, 'Anglo-Saxon and Early Anglo-Norman *Mappaemundi*', pp. 341–67, especially the schematic rendition of the two types on p. 347, and our Commentary on *ONT* 51.

22 E.g. in British Library, Cotton Tiberius B V (Winchester or Canterbury, s. xi$^{2/4}$), illustrated in Teresi, pl. 9.

zones must be mutually isolated, since they are separated by the impassable equatorial region. Bede does not go into the religious implications of this, namely that if humans did exist in the southern temperate zone, it would negate both the Biblical account of the origin of the human race, and Christ's command to take the Gospel to all mankind.[23] However, as we have seen, his general policy (in contrast to Isidore) is not to introduce theological issues or allegorical readings into *ONT*. God's act of creation is the overarching framework of the physical world, but Bede prefers to let particular facts tell their own story.

Bede's parting comment on the conditions at Thule is also rather curious. He seems to imply that the sun never shines there, and for this reason (*unde*) the sea is perpetually frozen. However, in *The Reckoning of Time* 31, and even in *On Times* 7, Bede states that Thule, far from being in perpetual darkness, enjoys six months of unbroken daylight and six months of night. When he says that the outermost circles 'always lack the sun', he may mean only that the sun is never directly overhead, as happens between the tropics of Cancer and Capricorn. See p. 79, n. 55.

ONT, Chapter 10: The Regions of the World

In this chapter, Bede shifts his perspective slightly, from the *circles* of the world, to its *plagae* – 'regions' or 'quarters'. The context shows that he is working with the ancient Greco-Roman technique for laying out a sundial on the ground – making a compass or wind rose. This technique was certainly known in Bede's time and milieu, because it is represented in the astronomical sundial in the early eighth-century Calendar of St Willibrord (Paris, BNF lat. 10837, fol. 42r).[24] Willibrord's diagram specifies a solstitial day of 18 hours, so it was plainly created in the northern British Isles.[25] To fashion such a compass, an observer in the northern hemisphere would have to face south, since the sun will always be south of the zenith. The dial or compass would be marked with the points on the horizon where the sun rises and sets on the two solstices and the equinoxes. The positions of sunrise

23 Augustine, DCD 16.9, discusses the question. Irish scholars were particularly curious about the possibility of antipodeans: see Smyth, *Understanding the Universe in Seventh-Century Ireland*, pp. 285–90 and Carey, 'Ireland and the Antipodes', pp. 1–10.

24 This technique is described in Pliny's *NH* 18.323. Bede did not have access to this book, but he and his contemporaries may have learned it from a manual of surveying.

25 See Obrist, 'The Astronomical Sundial in Saint Willibrord's Calendar and Its Early Medieval Context', esp. pp. 84–88. On prehistoric and ancient horizon calendars, compasses and wind roses, see Taub, *Ancient Meteorology*, pp. 103–6; and McCluskey, *Astronomies and Cultures in Early Medieval Europe*, pp. 11–18, esp. p. 15.

and sunset could be used anywhere on the globe, regardless of latitude, to establish the cardinal directions. Since the sun rises due east everywhere on earth at the equinoxes, the line between the equinoctial sunrise and sunset, passing through the observer, will divide the disc of the horizon in half. The 'east' is the zone of the horizon within which a sunrise can occur, with the point of equinoctial sunrise in the middle. The 'west' is the corresponding zone of possible sunsets. The 'south' is the space between the winter sunrise in the east and the winter sunset in the west, with due south in the middle of this arc; the 'north' is the corresponding sector between midsummer sunrise and sunset. East and west will be equal slices of the pie, as will north and south. However, depending on latitude, the east-west and north-south pairs will differ in size. As Bede observes, the length of the equinoctial day is constant, but the length of solstitial days will vary with latitude. The east-west and north-south regions are equal [*aequalia*] only for persons halfway between the equator and the pole. They become progressively distorted as one moves either to the north or to the south. On any day of the year a line drawn from the point on the horizon where the sun rises through the observer on to the point on the horizon where the sun sets six months later will always be straight.

The use of a sunrise-sunset diagram as the basis of a compass can be illustrated by a *horologium* in the Willibrord tradition, based on a *computus* manuscript of the early twelfth century, Oxford, St John's College 17, fol. 35v (Figure 2). The centre of the diagram marks the observer's position, facing south (top); the circumference is the horizon.[26] It is interesting, nonetheless, that Bede does *not* include such an illustration, or indeed any other illustration, in *ONT.* His model, Isidore's *DNR*, was famous for its schemata, particularly the circular diagrams that earned it the alternative title of *Liber rotarum.* But Bede seems to have deliberately chosen to eliminate them.

ONT, Chapter 11: The Stars

Bede packs a substantial amount of cosmology into this chapter. First, he distinguishes two types of star: the stars that form the constellations, which are represented as fixed in the revolving shell of the firmament, and which rotate with that shell from east to west once each day; and the planets beneath them, which pursue an errant course. Small fiery bodies can fall from the ether into the atmosphere, and be blown about by the winds; these

26 For a description of the technique, see Obrist, 'The Astronomical Sundial in Saint Willibrord's Calendar and Its Early Medieval Context', pp. 71–118. See also below, p. 173.

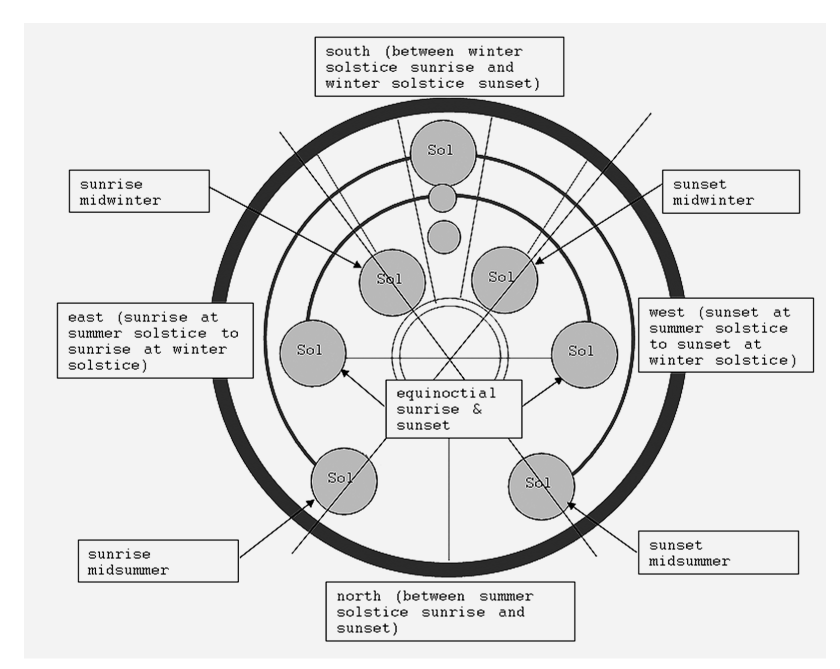


Figure 2 Horologium

are (*inter alia*) the comets, and are not to be confused with the planets, as their movement is not produced by the revolutions of the heavens. Bede also introduces the subject of celestial influence. This was a fundamental and unquestioned notion in ancient physics. The heavens move and so are active; the earth does not, and so is passive. Changes in the position of the sun affect the seasons, and the moon's phases control the tides; hence it stood to reason that other terrestrial phenomena were subject to the influence of the planets and stars. However, Bede in accordance with the ancient traditions of astrometeorology keeps this influence on the macroscopic level of the weather and seasonal change,[27] and avoids any suggestion of astrology. Rather remarkably, Bede does not refer to the use of the stars as a nocturnal clock for monastic time-telling, or for corroborating the solar year.[28]

27 Cf. *On Genesis* 1.1:17b-18b, trans. Kendall, pp. 83–84. See also North, 'Medieval Concepts of Celestial Influence', pp. 5–17; and for the classical background of astrometeorological almanacs and *parapegmata*, Taub, *Ancient Meteorology*, pp. 7–8, and ch. 2 *passim*.

28 For monastic time-telling by stars, see McCluskey, 'Gregory of Tours, Monastic Timekeeping, and Early Christian Attitudes to Astronomy', pp. 9–22; for the heliacal rising

ONT, Chapter 12: The Course of the Planets

The planets lie in the zone of the heavens below the fixed stars, but above the atmosphere. Bede explains that their trajectory is contrary to that of the universe as a whole, meaning that while they are borne about from east to west once each day like the fixed stars, they simultaneously, and at varying rates, move in the opposite direction, from west to east, along the path of the ecliptic and across its width. From our modern point of view, the Earth is rotating around the sun, as well as turning on its own axis. Hence, while the whole dome of heaven seems to rise in the east and set in the west once each day, the stars which we are able to see will change slightly every night, as we change our position in our annual orbit. Thus the dome of the fixed stars seems to move slightly faster than one full rotation each day. We see new constellations rising over the eastern horizon each evening, and the sun, in the course of a year, or the moon in the course of a month, seems to move 'backwards', from west to east, along the zodiac. Bede alludes to the phenomena of planetary station and retrogradation, but does not explain these at any length. Briefly, in the course of their circuit around the ecliptic, the outer planets (Mars, Jupiter and Saturn) will occasionally appear to stop and go backwards before resuming their journey from west to east. This is an illusion created by the earth's movement around the sun in the course of the year. The revival of Ptolemaic astronomy in the west, particularly from the twelfth century onwards, would provide sophisticated geometrical models to explain this phenomenon, but Bede, following Isidore, envisaged it as the product of the sun's attractive power.

If you are in the northern hemisphere, you will always have to face south if you want to look at the ecliptic, the path of the sun and the planets. If you are facing south, the heavens, in their diurnal rotation, will rise on your left (east) and set on your right (west). In the course of their journey around the zodiac, the planets will, at varying speeds, 'swim against the current' from your right (west) to your left (east).[29]

ONT, Chapter 13: Their Order

Bede now explains that the planets are not all on the same plane, but arranged in vertical order. Saturn is the farthest from Earth, and also from the sun, and so is cold. Its journey through the zodiac requires thirty years. Jupiter, the next in line, is temperate, but Mars, which is next to the sun, is fiery. The sun

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and setting of stars as means of indirectly defining the solar year, see McCluskey, *Astronomies and Cultures*, p. 8.

29 See the Byrhtferth gloss in PL 90, 209 and 327–28.

is in the middle of the ladder. Below it lie Venus, Mercury, and the moon. Venus and Mercury seem, from a geocentric perspective, constantly to hover in the vicinity of the sun; from our modern heliocentric viewpoint, we know that this is because their orbits lie within that of the earth. Finally, there is the moon, which passes around the zodiac in 27 days and eight hours – a sidereal lunar month. Bede, however, wants to focus on the synodic lunar month of about 29 ½ days, from one conjunction of the moon and sun to the next. In particular, he is interested in the length of the moon's occultation at conjunction, and how this compares with the periods of occultation of the other planets. The final sentence is somewhat confusing, as Bede may not have fully grasped what Pliny was saying here. Pliny is speaking of the three higher planets: Mars, Jupiter and Saturn. When they are in conjunction with the sun at sunset, they will never be more than 11 degrees away at sunrise. What Bede meant by 'and indeed they sometimes rise seven degrees from it' is impossible to determine, nor can his source be traced. The medieval glossators appear to have passed over this passage in silence.

It is important to remember that the periods Pliny and Bede are discussing here are those of the planets' circuits of the zodiac, which from Bede's point of view are their orbits around the earth, not their orbits around the sun. For the outer planets, Saturn, Jupiter, and Mars this makes little practical difference, and their zodiacal orbits are good approximations of modern values for their solar orbits (29.46, 11.86, and 1.88 years, respectively). But for the inner planets this is not so (the period of Venus's orbit about the sun is approximately 225 days, and that of Mercury's 88 days). Housman, 'Anth. Lat. Ries. 678', p. 33, claims that in Ptolemaic geocentric astronomy the times of Venus's and Mercury's revolutions around the Earth are 'necessarily the same as the sun's, 365¼ days, though a single and particular revolution of either may exceed that time or fall short of it within certain limits'. But it is difficult to see why their orbits should have been interpreted as one year (as, according to Housman, was the teaching of Eudoxus) rather than 348 and 339 days.

***ONT*, Chapter 14: Their Orbits**

This passage from Pliny enunciates the doctrine of eccentric planetary orbits, with its corollary of variable velocity. In the Carolingian period, it was not only excerpted in computistical 'encyclopaedias', but illustrated with a diagram showing the apogee and perigee of each planet against the backdrop of the zodiac.[30] That Bede should have included this material,

30 See the numerous studies by Eastwood, most recently *Ordering the Heavens*, ch. 3, part 4.

which is not in Isidore, suggests a personal interest in celestial mechanics for its own sake.

ONT, Chapter 15: Why Their Colours Change

Here again, Bede includes material from Pliny that bespeaks a curiosity about the planets that transcends the utilitarian needs of a school manual or adjunct to *computus*. Bede may have been skating on thin ice here. This chapter implies that the planets have distinctive characters, and that they interact with one another. Pliny had no difficulty with this concept, but Bede may have come to feel that this was not suitable speculation for a Christian scholar. In *The Reckoning of Time* 8, he will return to the theme of the characters of the planets, but in a different context, namely in connection with the Roman names of the weekdays. The tone changes to one of condemnation: this is 'the foolishness of the Gentiles, buttressed by faulty reasoning'.[31]

ONT, Chapter 16: The Circle of the Zodiac

The discussion of the zodiac flows naturally from the description of the planets, since the zodiac is the path along which they travel. It also allows Bede to tie the discussion of the planets back into the preceding material on the climates, for the northern and southern boundaries of the zodiac – the tropics of Cancer and Capricorn – are the boundaries of the habitable zone of the earth. Once again, however, Bede seems to have been captivated by the details of planetary astronomy. In this case, it is planetary latitudes, or the apparent weaving of the planets across the width of the zodiacal belt, a pattern produced by the fact that the plane of each planet's orbit is slightly different from that of the sun, which defines the zodiac. The moon's orbit, for example, is tilted at five degrees to the ecliptic, which is why it is not eclipsed at every conjunction. In this chapter, as in *The Reckoning of Time* 26, Bede repeats Pliny's strange assertion than the sun travels down the middle of the zodiac with a wavy and serpentine course. On the face of it, this is absurd: the sun's course is what defines the zodiac. How Bede or Pliny understood this claim is difficult to say, but Carolingian glossators and artists dutifully tried to represent the sun as weaving up and down along of the centre of the ecliptic.[32]

31 *The Reckoning of Time*, trans. Wallis, p. 34.
32 Eastwood, *Ordering the Heavens*, ch. 3, section 5.

ONT, Chapter 17: The Twelve Signs

This chapter is a careful interweaving of material from Isidore's *Etymologies* and an anonymous text entitled *De causis quibus nomina acceperunt duodecim signa*.[33] Its intention seems to be to reduce the meaning of the zodiac signs as much as possible to naturalistic terms connected with the weather conditions of the relevant season, or to astronomical phenomena such as the reversal of the sun's path in Cancer. Occasionally a reference to Greek mythology is unavoidable, but the reader is warned in advance that these are pagan *fabulae*. When he comes to treat the same subject in *The Reckoning of Time* 16, Bede will drop the explanations of the names of the signs entirely. What is emphasized there is the *order* of the signs, which should be memorized in order to calculate the position of the sun or moon.

Bede regarded the zodiac as an arbitrary system of less than fundamental significance. Here he accepts the 15th kalends of the month as the beginning of each sign, as he later does in *DTR* 6. But there, when it comes to the more critical matter of the vernal equinox, he asserts that by nature the equinox is the beginning of the zodiacal cycle, and that the vernal equinox is in the 4th degree of Aries. The zodiac begins on the anniversary of the first day of creation, but the vernal equinox was created on day four, when the sun was created.[34]

ONT, Chapter 18: The Milky Way

This extremely short chapter not only reveals once again Bede's early curiosity about astronomy, but also the distinctive texture of his critical spirit. The theory that the Milky Way is illuminated by the sun's passage is relayed by Isidore (*Etym.* 13.5.7 and 3.46). It can also be found in book 18.281 of Pliny's *Natural History*, and in Macrobius's *Saturnalia*, neither of which Bede had access to. Bede offers an unprecedented critique of this theory: how could the Milky Way be kindled by the sun's transit, when the ecliptic only intersects the Milky Way in Sagittarius and Gemini? Where Bede learned this bit of astronomy is uncertain: it is found in Martianus Capella, an author he seems not to have known, but also shows up in ch. 115 of the Bobbio *Liber de computo* (PL 129, 1329), so it might have reached him through an Irish intermediary. In any event, Bede rejects the notion, but offers no counter-theory. Hence we are left to reflect on what the objection itself can tell us about Bede's interests and way of thinking. Bede seems to be interested in the nature and source of light in the heavens. Not only does

33 Ed. Jones, CCSL 123C, 663–67; also in Jones, *BP*, pp. 102–3.

34 See Wallis, *The Reckoning of Time*, pp. 275 and 287–90.

he specify in ch. 11 that the stars borrow their light from the sun, but he includes an entire chapter (15) on the different colours of the planets, and how they change. He also shows a marked fascination with the power of the sun, its ability to control the movement of other planets (ch. 12) and its fiery nature (ch. 19), which determines the climates of the planets in general (ch. 13) and the different zones of the earth (ch. 9). He does not seem to have regarded the Milky Way as a belt of stars, for otherwise he would have ascribed their light to the sun. It is, rather, a shape (*figura*) or white circle (*candidum circulum*). In sum, Bede did not quite know what to make of the Milky Way, and did not find the conventional explanations satisfactory. It was not a topic that he chose to recycle in *The Reckoning of Time*, for like the colours of the planets, it was not even distantly relevant to time-reckoning. Interestingly, the Carolingian glossators simply explained and documented the theory which Bede rejected.[35]

ONT, Chapter 19: The Course and Size of the Sun

Bede's error concerning the relative sizes of the moon and earth will be repeated and reinforced in ch. 22 below. The notion that the sun is somehow nourished on water (derived from Isidore) is retailed without comment. Presumably it refers to evaporation. In any event, Bede quietly dropped the idea in favour of focussing on the moon's control of moisture (*The Reckoning of Time*, chs. 28–29).

ONT, Chapter 20: The Nature and Place of the Moon

This chapter contains a number of points which apparently caused Bede's readers some confusion, and which he would later clarify in *The Reckoning of Time*, chs. 25–26. He paraphrases Pliny to make the following claims. First, as the day grows longer (*die quidem crescente*), a new moon (that is, a newly visible crescent moon) will appear 'supine', that is, with its horns pointing upwards from the horizon, as if it were on top of the sun (*utpote superiorem soli*) and lying to the north. When the day grows shorter (*decrescente*) the moon will appear upright, with its horns pointing to the side, and to the south. A full moon is always diametrically opposite the sun, 'being elevated with respect to the low sun and low with respect to the elevated sun'. Apparently, Bede's readers had problems with two issues: first, Isidore in *DNR* 38 says that the shape of the new moon (supine or upright) is an omen of rain or dry weather; secondly, Bede's use of the terms *superior*, *sublimis* and *humilis* created a

35 See the Byrhtferth glosses (PL 90, 234–35) and the Laon-Metz glossator (ed. Lipp, in CCSL 123A, 210).

mistaken impression that the moon might actually be physically above the sun in the heavens, particularly when it appears further to the north of the sun in the sky – that is, closer to the zenith. Bede tackled the first problem in *The Reckoning of Time* 25. His explanation is somewhat compressed, and omits some astronomical technicalities, but it makes the following point: when the days begin to get longer than the nights – that is, at the spring equinox – a crescent moon appearing at sunset will be north of the celestial equator, and will be lit up from underneath so that its horns point upwards. When the days begin to grow shorter at the autumn equinox, the crescent moon at sunset will appear to the south of the celestial equator, and be lit up from the side. What Bede does not explain is that these variations are caused by that fact that the ecliptic, along which the sun and moon travel, crosses the celestial equator twice as it swings to the north and south; consequently, its angle vis-à-vis the celestial equator changes. The angular relationship between ecliptic and equator at sunset (when a new crescent moon will become visible) varies throughout the year, which means that a crescent moon may lie to the north or south of the equator, and be lit up from underneath or from the side.[36] These changes are absolutely regular, and have nothing to do with the weather. Indeed, when Bede excerpts Isidore's *DNR* 38, for his own *ONT* 36, he pointedly omits Isidore's comments on the shape of the crescent moon. The second point of confusion – namely, the precise meaning of 'above' – will be clarified in *The Reckoning of Time* 26, where Bede will explain that the visible position of the moon to the north or south of the sun is not connected to its physical location. When he says that the crescent moon at sunset on the vernal equinox seems to be on top of the sun, what is meant is that the angle of the ecliptic is such that the moon seems to be almost directly above the sun in a vertical line; that is why it is lit up from below.

***ONT*, Chapter 21: Method for Determining the Course of the Moon through the Signs of the Zodiac**

In their descent from the heavens to the earth, Bede's readers are now finally standing beneath the moon. At this point, Bede invites them to change their orientation and look *upwards* to consider the position of the moon in relation to the background of the zodiac.

This is perhaps the most difficult chapter of *On the Nature of Things* for a modern reader to understand. It contains Bede's earliest attempt to expound a mathematical-astronomical formula (*argumentum*). Bede provides a formula for finding the sign for a moon of any age – a striking departure from his

36 For a fuller explanation with illustration, see Wallis, *The Reckoning of Time*, pp. 301–4.

models, and evidence of the influence of *computus*. It should be compared to *Reckoning of Time* 17, where Bede fills in some of the background explanation that is lacking in this chapter, re-frames the terms in which the moon's advance on the sun is expressed, and alters the divisor from 9 to 10.[37] This formula (and its revised version) may have been Bede's own invention: the revised version is found in the Bobbio *Liber de computo*, ch. 110 (*PL* 129, 1326), and may be derived from *The Reckoning of Time*.

The problem Bede sets here is to determine through how many signs of the zodiac the moon will have advanced on any given day after the day of the new moon (on which day the sun and the moon will have been in the same sign, which is assumed to be known). The moon advances, Bede states, through one sign every two days and 6 2/3 hours. That being the case, through how many signs will it have advanced after, say, 12 days? Obtaining the answer in a reasonable amount of time is the obstacle to be overcome. With Arabic numerals and standard methods of long division it can easily be done. One method would be to divide 12 days by 2 days and 6 2/3 hours. Converting days to hours, the answer is 288 hours divided by 54 2/3 hours = 5 11/41 signs or 5 signs and 14 2/3 hours. Bede could do this, but, working with Roman numerals, it would be a tedious task.[38]

Alternatively, one can calculate the fraction of a sign that the moon advances through in one day, and then multiply that fraction by the number of days of the moon (here, 12). This is possibly what Bede did. The fraction that the moon advances equals one day (= 24 hours) divided by two days and 6 2/3 hours (= 54 2/3 hours), that is, 18/41 (not 41/18 as Jones, *BOT*, p. 353, erroneously states). 18/41 times 12 = 5 11/41 or 5 signs and 14 2/3 hours, as above. Again, such a fraction (18/41) would be difficult to work with in Roman numerals, though Bede may have done so in order to come up with the formula that he offers to his readers.

How Bede constructed his formula remains unknown. We attempt a hypothetical reconstruction of his approach in Appendix 2. The formula suggests that Bede had an amazingly agile mathematical mind. We have already stated that he had to know the correct solution in order to construct the formula. It appears to be a procedure that is uniquely suited to this problem. It is simple to apply, requiring no more than a knowledge of how to multiply and divide by the numbers from one to nine. But the reason why it works is not transparent and cannot be understood without the ability to

37 See Jones, *BOT*, p. 353.

38 On the difficulty of performing calculations with Roman numerals, see Wallis, *The Reckoning of Time*, pp. 254–63.

make calculations more complicated than any Bede expected his readers to be able to perform.[39] Wallis's suggestion that 'the technique of calculation was only taught to some advanced and dedicated students',[40] goes far to explain why Bede does not reveal his calculations in this chapter.

The formula in *On the Nature of Things* differs from the corresponding one in *The Reckoning of Time* 17, in two ways. First, it expresses zodiacal distance in terms of signs and hours, whereas the *Reckoning* formula uses signs, *puncti*, and *partes.* Secondly, its goal is to find the position of a moon of any given age in the zodiac itself, whereas the *Reckoning* formula is designed to find out the distance along the zodiac which separates a moon of any given age from the sun. Hence in *The Reckoning of Time* 17, one multiplies the age of the moon by 4 (the moon travels 4 *puncti* away from or towards the sun per day) and divides by 10 (there are 10 *puncti* in a zodiac sign). This formula takes into account the forward movement of the sun through the zodiac by 1/3 *punctus* (or one *pars*) per day. Hence if one multiplies the age of a full moon of 15 days by 4 (60) and divides by 10, one will find the full moon exactly opposite the sun in the zodiac, six signs away. However, that same full moon will have actually advanced along the zodiac by six and one-half signs from the sign where it first appeared as a new moon, because the sun, during the fifteen days which have elapsed from conjunction to full moon, will have simultaneously advanced the distance of one-half of a zodiac sign.[41]

It is curious that such a formula should be provided in *ONT* and not in *OT*. It was clearly a subject which exercised Bede greatly, since he devotes considerable space to the issue in *The Reckoning of Time* (chs. 17–19) and

39 Bede introduces the topic of performing arithmetical calculations in *DTR* 1, 'Calculating or Speaking with the Fingers'. He does not explain how to multiply with large figures or do long division.

40 Wallis, *The Reckoning of Time*, p. 261.

41 The different intentions of the two formulas seem to have derailed some medieval readers. The Byrhtferth gloss in PL 90, 237–39, refers to this formula as an 'argumentum inusitatum' but professes to find it preferable in terms of accuracy. However, Byrhtferth made the mistake of assuming that *The Reckoning of Time* formula was to find the position of the moon in the zodiac, and not to find the relative zodiacal distance separating the moon from the sun.

Why did Bede choose to provide a different formula, and more importantly, a totally different problem in *The Reckoning of Time*? We may speculate that the while the *relative* calibration of the moon's phases to the movement of the sun through the tropical year had evident computistical applications, Bede may have decided that there was no point in knowing what sign of the zodiac the moon was in *per se*. Indeed, such knowledge might even smack of astrological calculation. He certainly steers readers of *The Reckoning of Time* firmly away from any interest in tracking the sun's precise position in the zodiac (cf. *The Reckoning of Time* 3).

furnishes no less than three methods of locating the moon in the zodiac, including a table. And yet it has little or no direct computistical value. Knowing the *age* of the moon was definitely important for calculation, and the related issue of its appearance and phase was significant from the point of view both of establishing a credible Paschal cycle, and of explaining the theological significance of the rules for determining Easter. Where the moon stood in the zodiac was not *per se* a matter of computistical interest. Where it might have had relevance was in the medical sphere. In the *Ecclesiastical History*, Bede relates the story of how bishop John of Beverly (d. 721) healed a nun at Watton of a swollen arm consequent on a bloodletting operation:

> The abbess asked the bishop to deign to visit her and give her his blessing, believing that she would greatly improve if he blessed or touched her. Then he asked when the girl had been bled and, on hearing that it was on the fourth day of the moon, he exclaimed, 'You have acted foolishly and ignorantly to bleed her on the fourth day of the moon; I remember how Archbishop Theodore of blessed memory used to say that it was very dangerous to bleed a patient when the moon is waxing and the Ocean tide flowing. And what can I do for the girl if she is at the point of death?'.[42]

It should be noted that John states that a waxing moon contra-indicates bloodletting. Neither here nor in ch. 28 of *The Reckoning of Time* does Bede state that the position of the moon in the zodiac should be taken into account. However, schemata linking body parts to the signs of the zodiac, and accompanied by admonitions concerning bloodletting from that limb when the moon is in the relevant sign, go back to Antiquity.[43]

ONT, Chapter 22: The Eclipse of the Sun and the Moon

From this new vantage point (see above, p. 150), Bede's reader can now observe solar and lunar eclipses (chs. 22–23). One of the purposes of this chapter – perhaps of the study of *computus* and the compilation of tables – may have been precisely to allay anxiety about eclipses.[44]

Bede's erroneous idea about the size of the moon and earth is picked up from ch. 19; it is also repeated in *DTR* 27. The Carolingian glossators, and notably the BDTR glosses (see Introduction, p. 40) quietly rejected this notion, but they had the benefit of access to Martianus Capella and Calcidius. Why did Bede believe this? Quoting Pliny, Bede states that a total eclipse

42 *EH* 5.3, trans. Colgrave and Mynors, p. 461.

43 The concept goes back to Ptolemy, *Tetrabiblos* 3.12, 147–48; see Tamsyn Barton, *Ancient Astrology*, pp. 189–94; Nutton, *Ancient Medicine*, p. 266.

44 Cf. BDTR gloss on ch. 22 (PL 90, 412.10–413, end).

of the sun would not be possible if the moon were not larger than the earth. The unstated assumption here is that an eclipse of the sun renders the sun invisible across the whole earth, or at least the hemisphere facing the sun, as if it were night. This would indeed be the case if the moon were the same size or larger than the earth, but since it is smaller the eclipse will be visible only from within the cone of the moon's shadow. Bede does not appear to know that the lunar shadow is conical and that solar eclipses are not visible everywhere on earth; hence he argues that the moon must be larger than the earth in order to block the sun's light – by implication, across the whole planet. Bede's sources did not help him here. Pliny (*NH* 2.10.56) mentions that eclipses are not visible everywhere, but ascribes this to (a) local cloud cover, or (b) the fact that a lunar eclipse would only be visible in the half of the planet where it was night-time, and a solar eclipse only where it was daylight. Isidore (*DNR* 20-21, *Etym*. 3.58–59, *Letter of Sisebut*) does not mention local visibility at all.

A major flaw in Bede's argument is that if the moon were larger than the earth, it would not be totally eclipsed by the shadow of the earth, which must be conical, since the earth is smaller than the sun. This point is implicitly addressed by Calcidius in his commentary on the *Timaeus*, who reports Hipparchus's estimate that the earth is 27 times larger than the moon, and was well known from the Carolingian period onwards.[45] His argument and the diagrams illustrating it later found its way, via the eleventh-century computist Abbo of Fleury, into Noviomagus's edition of Bede's *The Reckoning of Time*, and thence into Migne's edition (PL 90, 223).[46]

ONT, Chapter 23: Where there is No Eclipse and Why

This chapter, taken from Pliny, reinforces the impression that Bede did not know that eclipses were visible only along specific tracks. Pliny imagines that the only regions which cannot see an eclipse are those where the earth itself is blocking the view, i.e., where the sun has already set or has not yet risen. The shadow of the eclipse is equated with the shadow of night sweeping across the planet.

ONT, Chapter 24: Comets

The changeable moon and the anomalies of eclipses form a suitable transition to the realm of air, and the zone of unpredictable, albeit natural, atmospheric phenomena, such as comets and pestilences (chs. 24–37). The chapters on

45 Calcidius, *Timaeus*, pp. 139–44.

46 For the diagram, see Obrist, *La cosmologie médiévale*, pp. 138–39, and fig. 36.

the air all stress change, variation and local peculiarity, and in this respect contrast with the chapters on the celestial phenomena of the zone of fire. Comets, following ancient philosophers, are regarded as atmospheric events. Bede's text highlights their sudden, unpredictable appearance, the highly variable length of time in which they are visible, their restricted range, and the unusual events they portend. The reference to portents, drawn from Isidore's *DNR*, is rather unusual in itself, for both Bede and Isidore are concerned to downplay the idea that natural events are necessarily prophetic signs (see Introduction, pp. 1–2). Indeed, rainbows, winds, weather and seismological events were the targets of attempts at rationalization of the natural world from the pre-Socratic philosophers to Lucretius, Seneca and beyond. Bede for the most part stands (albeit unconsciously) within this tradition.

ONT, Chapter 25: The Air

Bede's theme of air as the region of variation and anomaly continues to be played out here. The atmosphere is not uniform, but varies in limpidity and luminosity, depending on altitude. Even the boundaries between air and heaven seem uncertain. The upper atmosphere between the air and the ether is said to belong to 'heaven', but it is not the 'heaven of heavens' where the stars are found, nor yet the quasi-heavens of the lower atmosphere, which is subject to destruction by flood and fire. The indeterminate nature of the 'heavens' had eschatological implications for Bede. In this chapter, he alludes to 2 Peter 3:6, a passage which exerted a particular fascination for him. It seemed to him proof, albeit negative proof, that the celestial regions would not be involved in the destruction and remaking of 'heaven' and earth at the end of the age. The only 'heaven' that would be burnt up would be the quasi-heavens of the air.[47] He expounded on this idea at considerable length in his exposition of 2 Peter in the *Commentary on the Catholic Epistles*, and in *The Reckoning of Time* 70.[48] His major source here was Augustine, *The City of God* 20.24, but the intensity with which Bede pursued this idea suggests that it was particularly important for him.

ONT, Chapter 26: The Winds

The agitation of the winds reinforces the theme of instability in the regions of the air. Isidore's account of the origin of the winds paints a picture of

47 Bede remarks that the Bible often uses the term 'heaven' when it means 'air': see *On Genesis* 1.1:20, trans. Kendall, p. 85.

48 *Ep. Cath.* 277.35-48, 279.110-25; trans. Hurst, pp. 147–48, 150–51. See Wallis, *The Reckoning of Time*, pp. 370–73.

violence and coercion: the winds are pressed together and shot out of mountain defiles, and their arbitrary movement summons the Biblical image of God as lord of the winds.

ONT, Chapter 27: The Order of the Winds

The catalogue of the winds not only reinforces the imagery of variety, but also serves as a bridge to the phenomena Bede will expound in the next chapters. The winds are connected to snow and hail, thunder, tempests and earthquakes. So peculiar are the winds that even neighbouring regions or cities within the same province have distinctive winds.

ONT, Chapter 28: Thunder

The theme of violence that underlies Bede's description of the winds is expanded in this chapter on thunder. Winds pent up in clouds produce thunder by causing the clouds to whirl about chaotically, crashing together like chariots colliding as they shoot out of the starting gate. By way of contrast, in his biographical sketch of Chad in *EH* 4.3, Bede commends as piety what he might have condemned (in the context of *ONT*) as superstition, namely the fear that any violent storm with thunder and lightning was a divine communication or warning of the Last Judgement.

ONT, Chapter 30: Where Lightning Is Not and Why

Of all the uncanny phenomena of the atmosphere, lightning is the most local. Bede draws on Pliny to give a natural explanation of why it occurs in certain places or certain times. One may suspect an agenda here: to debunk the notion that lightning strikes are bolts of divine wrath intentionally aimed.

ONT, Chapter 31: The Rainbow

This chapter and the next four are devoted to a group of phenomena that straddle the frontier between air and water. Rainbows and clouds are located in the air but formed of water suspended in the air; these aerial waters precipitate out as rain, hail and snow. In *On Genesis* Bede likewise remarks on the close affinity of air and water, and how air, though technically lighter than water and earth, can nonetheless support watery bodies like clouds and earthy ones like birds.[49]

The guiding purpose of *ONT* to furnish essentially natural explanations of phenomena leads Bede to analyse the rainbow without any reference to the Flood. Isidore's theory that the rainbow is the reflection of the sun against

49 *On Genesis* 1.1:20, trans. Kendall, p. 85.

the black rain-cloud is essentially that of Aristotle's *Meteorology* 3.1-5. The rainbow, according to Aristotle's fuller account, is caused by the sun's rays, reflected from a dark rain-cloud to the eye of the observer. This reflection is a band of colours because the cloud is made up of numerous small drops, too small to reflect sun in its entirety, but capable only of reflecting its colours. However, Aristotle considered the cloud as a single reflecting surface, and did not investigate the effect of light falling on a single drop. Nor did he provide a very satisfactory explanation of why the reflection was visible as a bow, or why only certain colours were produced. One of the most interesting and original achievements of medieval science was to critique this inadequate model and to propose an optical-mathematical and physical explanation.

ONT, Chapter 32: Clouds

Using pseudo-Isidore and Isidore, Bede assembles a very credible explanation of the nature of clouds as condensed water vapour, formed by evaporation. However, the heat of the sun and the action of the winds are regarded not so much as the forces responsible for vaporization as the means by which water from any source is transmuted into sweet rain water. He invokes an idea which he will revisit in chapter 38, namely that filtering salt water through soil will make it sweet, just as straining sweet water through sea-weed will make it salt.

ONT, Chapter 33: Rains

Clouds, being composed of water vapour, are essentially made of tiny drops of water. Bede imagines these droplets coalescing into larger drops which the air can no longer hold up (see ch. 8 on the waters above the firmament).

ONT, Chapter 36: Signs of Storms or Fair Weather

The weather signs in this chapter are purely atmospheric – effects of the air and clouds on the appearance of the sun and moon. Bede passes over the notion purveyed by Isidore that the shape of the moon is an omen of weather (see Commentary on ch. 20), though he appreciates the role of the constellations as markers of the seasons in announcing changes to the weather (see above, ch. 11).

ONT, Chapter 37: Pestilence

To the modern reader, a chapter on epidemic disease in the midst of a discussion of meteorology seems anomalous. Until the nineteenth century, however, this would have seemed quite normal. From the time of Hippocrates's

Epidemics and *Airs, Waters and Places* onwards, westerners were accustomed to conceiving of an acute disease affecting many people simultaneously and in the same vicinity as the result of 'infection'. This infection was not, however, invasion by a subvisible microbe, virus or parasite; it was the tainting or corruption of the environment – the air in particular, but in consequence, the water and soil as well. This corruption was due to some kind of putrefaction or rotting, often visualized as a mist hanging in the air, or a warm muggy wind. Unseasonable weather could trigger this corruption. As Bede explains, pestilence is hatched from such corrupted air. Because air is ingested by all breathing creatures, and also penetrates the food grown in the soil, many people simultaneously fall ill. But Bede also struggled to incorporate a Biblical view of pestilence as the consequence of sin, something sent because of human fault. Not every event of this kind is a heavenly sign, however; sometimes bad weather is just bad weather. Bede's hesitations and qualifications are far from unusual; even Gregory of Tours, always on the alert for indicators of God's imminent justice, sometimes reported bizarre weather or outbreaks of pestilence without coming to any conclusion about the role of God. Gregory's account of the plague of Marseille in *Historiae* 9.22 is a case in point. He begins with a straightforward account of the plague's arrival by ship in the port and spread through the town. Bishop Theodore ordered prayers and vigils; the plague eventually burned itself out, not immediately (which would suggest a miracle) but after a couple of months … but then came back again. Gregory offers no comment, which is his usual way of signalling his inability to read a divine message into any unusual event.[50] In his *Ecclesiastical History*, Bede on the whole prefers to imply, rather than assert, that a plague is a divine visitation. He hints broadly that the plague that smites the dissolute Britons is punishment for their sins (1.14), but does not rub the point in. The saintly Etheldreda prophesies a coming plague, which implies that it was no merely natural event (4.19). The plague which carried off the pious and penitent Irish scholar (3.13) is described in neutral terms, though it might be an illustration of how a Christian should respond to an outbreak of disease; this is surely also the case with the accounts of exemplary deaths of plague victims in 4.7-8. The plague outbreak which killed Cedd (3.23) is reported in a matter-of-fact way, but the plague which carried off Chad in 672 (4.3) is explicitly a divine act. Bede rebukes the desperate East Saxons for reverting to paganism in their search for relief from the plague (3.30), which hints that they failed

50 De Nie, *Views from a Many-Windowed Tower*, esp. ch. 1.

God's trial of their faith; this is made explicit in the parallel account of how some Northumbrians in the time of Cuthbert apostatized under similar circumstances (4.27). The plague of 664 which claimed bishop Tuda (3.27) is not depicted as divine in origin, though the chapter opens with an account of the solar eclipse of that year. However, while Bede is willing to entertain the notion that comets are omens (*ONT* 24), he treats eclipses that take place under normal astronomical conditions as natural events. In sum, Bede, like most medieval authors, prefers to leave his options open when it comes to determining the cause of pestilential disease. Moreover, divine will and natural processes were not regarded, particularly in the early medieval period, as mutually exclusive. Bede's world had no place for what later theologians would categorize as 'the supernatural'.[51] God's actions in the world were detected, rather, by observing the preternatural, particularly the preternatural acceleration of natural processes.[52]

ONT, Chapter 38: On the Dual Nature of the Waters

Chapters 38 through 42 seem to be a series of answers to questions: Which is natural, fresh water or salt water? What causes the tides? Why does the sea not overflow with all the water that pours into it? Why is it salt, despite the fact that fresh waters empty into it? Is the Red Sea really red?

ONT, Chapter 39: The Ocean's Tide

In this chapter Bede seizes upon disparate observations about the moon and the tides in Pliny's *Natural History* and Pseudo-Isidore's (Irish) *Liber de ordine creaturarum* to sketch an analysis of their relationship that proved to be more precise and accurate than any previously attempted in western science. He would expand and in some respects modify this analysis in *The Reckoning of Time*.[53] The key to his achievement was his insight in linking Pliny's (somewhat obscurely worded) observation that the moon rises 47½ minutes later each day (*NH* 2.11.58) with his statement in a different context that peak high tides are correlated with the full moon and that they (whether Pliny means peak high tides or merely high tides is unclear) recur at the same

51 On the development of this distinction, see Bartlett, *The Natural and the Supernatural in the Middle Ages*.

52 Smyth, *Understanding the Universe*, p. 232. Augustine, *Tractatus in Iohannem* 8.1 (CCSL 36, 81–82) describes the miracle of Cana, and states that what was miraculous was that the natural process by which the water in grapes becomes wine was spectacularly speeded by Christ's divine action. See also *The City of God* 21.4, 8.

53 On the changes introduced by Bede in his later book, see Eckenrode, 'The Growth of a Scientific Mind', pp. 187–212.

moment of the day after a period of a little more than eight years, specifically after 100 lunar months (*NH* 2.99.215). It was Bede's genius to equate Pliny's figure for the retardation of the moonrise with his or his countrymen's empirical observations of tidal advances and to recognize that this implied a periodic cycle of the tides.

When he came to write *DTR* 29, he seems to have realized that he could not give mathematical precision to tidal periods in terms of the nineteen-year lunar cycle even though he knew that the tides followed the moon, and he may have felt it prudent not to calculate a tidal cycle on the basis of a 48-minute advance (the figure that he gives in *DTR*). For some reflections on Bede's thinking in this chapter of *ONT*, see Appendix 2.

ONT, Chapter 41: Why It Is Bitter

Bede is entirely correct that *the surface water of the seas is fresher than the depths*, but his source, Pliny, actually says the opposite, namely that deeper waters are sweeter than surface waters (Pliny, *NH* 2.103.222).

ONT, Chapter 43: The Nile

This chapter points to the roots of *ONT*, through Isidore, in ancient school cosmographies. The remarkable annual flooding of the Nile, to say nothing of the mystery of its origins, was a classic locus of scientific curiosity. Seneca devotes all of book 4a of the *Natural Questions* to this topic, but Bede's principal source, Isidore, seems to have used Lucretius, *DRN* 6.716, 721–23.

ONT, Chapter 44: That the Earth Is Bound by Waters

This is one of Bede's characteristic bridging chapters, in which, quite literally, the realms of water and that of earth intersect. Pliny's language is vivid, even emotional. Earth and water embrace to their mutual advantage, for earth would not hold together were it not moistened, and water would have no place were it not contained by the earth.[54] Not only does water girdle the earth's surface, but it penetrates to its interior, and breaks out from its summits.[55] Somewhat uncharacteristically, Bede adds a reference to the Creator in the opening sentence. This may be a devout response to Pliny's rapturous language, but it may also be Bede's way of neutralizing

54 A somewhat similar reflection on the interdependence of earth and water is found in Bede's *On Genesis* 1.1:24, trans. Kendall, p. 88.

55 Bede discusses the interpenetration of land and water in connection with the separation of earth and sea on the third day of creation in *On Genesis* 1.1:9, trans. Kendall, p. 78.

the implication that the earth is a living being, perhaps a divinity. The issue was a very real one for Bede. In chapter 2 of *The Reckoning of Time*, in the midst of discussing the distinction between conventional and natural ways of dividing time, he feels obliged to point out that '[T]his Nature was created by the one true God when He commanded that the stars which He had set in the heavens should be the signs of seasons, days and years; it is not, as the folly of the pagans asserts, a creating goddess, one amongst many'.[56]

ONT, Chapter 45: The Position of the Earth

When he turns to the earth itself, Bede refocuses his reader's attention on the fundamental architecture of his book: the four elements and their vertical arrangement. Earth is at the 'centre or pivot of the world' (ch. 45), because the element of earth seeks the lowest point; earthquakes and volcanoes are caused by air trapped within the earth and struggling to escape to its natural place (chs. 49–50). The sphericity of the earth can be demonstrated by the fact that different constellations are visible in different locations (ch. 46), and by the variations in sundial shadows and length of daylight with latitude (ch. 47).

ONT, Chapter 46: That the Earth Is Like a Globe

Bede has the distinction of being one of the earliest Christian-Latin authors to state emphatically and unambiguously that the earth is spherical. Indeed, in *The Reckoning of Time* 32, he will spell out this fact even more explicitly: 'It is not merely circular like a shield [or] spread out like a wheel, but resembles more a ball, being equally round in all directions'.[57] Most patristic writers, especially Latin writers, accepted the ancient scientific picture of a spherical earth without comment. But some, notably the Greek cosmographer Cosmas Indicopleustes, vigorously asserted the Biblical picture of the world as a flat rectangle of land poised over an abyss of water and crowned with a tent-like sky.[58] This theory may have been known in Bede's England, perhaps through texts brought by archbishop Theodore of Canterbury.[59] If it was, it may have been rather difficult to refute. Augustine acknowledged

56 Trans. Wallis, p. 14. For discussion of this remarkable passage, see Wallis, '*Si Naturam Quaeras*: Reframing Bede's "Science"', esp. pp. 80–82.

57 Wallis, *The Reckoning of Time*, p. 91.

58 On the patristic reception of classical views of the sphericity of the earth and Cosmas's counter-theory, see Inglebert, *Interpretatio christiana*, ch. 1.

59 On the knowledge of Cosmas Indicopleustes in Anglo-Saxon England, see Bischoff and Lapidge, *Biblical Commentaries from the Canterbury School of Theodore and Hadrian*, pp. 208–11; and cf. Neville, *Representations of the Natural World in Old English Poetry*, pp. 146–47.

that the sphericity of the earth was the general opinion of scientists and philosophers, but treats it as a hypothesis rather than an undisputed fact, and certainly not grounds for believing in the Antipodes.[60] The seventh-century Irish authors were even more ambivalent,[61] Hence Bede's rather forceful defence of the spherical earth may have been a response to real doubt and disbelief.

ONT, Chapter 47: The Circles of the Earth

These circles of latitude or *climata* are different from the circles described in ch. 9, which are on the celestial sphere, projected onto the earth, and which mark a celestial phenomenon, namely the passage of the sun around the inclined track of the ecliptic. These lines, however, represent a purely terrestrial phenomenon: the variation in the length of the day due to latitude, and the relative length of the shadow cast by the pin of a sundial. At many points in his writings on *computus*, natural science and Biblical exegesis, Bede likes to stress the distinction between the regular and uniform character of the heavens and the variations and particularities of terrestrial life. Variations in daylight with latitude is almost an obsession with him; he mentions it above in ch. 10, and even remarks in the opening chapter of the *Ecclesiastical History* on the length of the days in Britain. This fixation may have something to do with Bede's environment in northern England, where the extremes of summer light and winter darkness are so pronounced. But it is also a 'vocational' issue for monks, who were obliged constantly to adjust their schedules of communal prayer, particularly the night hours, to the changing lengths of day and night.[62] This chapter and the one which follows will be reproduced and expanded upon in *The Reckoning of Time*, chs. 31–33.

ONT, Chapter 48: More on the Same Subject: the Art of Using Sundials

This chapter is in a sense an appendix to the previous one. In it, Bede exploits a different section of Pliny's *Natural History* to illustrate some extreme cases of sundial shadows. The Mediterranean focus is evident, in that the northernmost point of reference is Ancona. But the issue is really the extreme south of the known world. Five thousand stades south of Alexandria, no shadow is cast at the summer solstice, which would put this site on the tropic of Cancer; but in the country of the Troglodytes, the shadows

60 See *The City of God* 16.9; cf. Inglebert, *Interpretatio Christiana*, p. 90.

61 Smyth, *Understanding the Universe*, pp. 271–78, 285 *sqq.*

62 For an illuminating discussion, see McCluskey, *Astronomies and Cultures*, ch. 6.

actually fall to the north of the gnomon, which means that this land is south of the tropic. Bede does not pick up on an important point here, namely that the land of the Troglodytes must therefore be within the uninhabitably torrid equatorial zone of the earth (see ch. 9).

ONT, Chapter 49: Earthquake

This and the following chapter seem, once again, to be responses to implicit questions. If the earth is the unmoved centre of the universe, why is it shaken by earthquakes? The response is framed in terms of the theory of the elements. Air 'unnaturally' pent within the earth struggles for release, causing violent shaking. The explanation of the volcanic activity of Mount Etna is an extension of these observations.

ONT, Chapter 50: The Fire of Mount Etna

Like earthquakes, volcanic activity was a favourite locus of ancient scientific and philosophical arguments that sought to provide physical explanations for apparently random and certainly terrifying phenomena. Mount Etna in Sicily has the distinction of being the subject of a poem in this vein, possibly (though not certainly) by Seneca's friend Lucilius.[63] Isidore, Bede's principal source of information, draws his lore from Pomponius Trogus, but the explanation is the classic one: wind moving at high pressure through underground channels. The reference to the 'dogs of Scylla' is a rare instance of Bede's retention of some of Isidore's material on classical mythology.

ONT, Chapter 51: The Division of the Earth

The reversion to the division of the earth's land masses after Mount Etna may seem anomalous, but Bede is following Isidore in this. Pliny also uses such a chapter to bridge the cosmology of Book 2 to the cosmography which follows. As Isidore did not use Pliny elsewhere in his *De natura rerum*, Fontaine considers this chapter a later addition, dating from the time of the composition of the *Etymologies*.[64]

In this chapter, Bede offers a concise description in two paragraphs of the geography of the world. The first paragraph, with the exception of the phrases, 'girded by the Ocean' and '[Asia] is comparable in size to the other two', is taken entirely from Pliny; it owes nothing verbally to Isidore.

Bede borrows his second paragraph from Isidore (with the changes we have indicated in the note). Isidore had it from Augustine.

63 Taub, *Aetna and the Moon*, pp. 45–55.
64 Fontaine, *Traité*, pp. 41–42.

The two details that Bede added to the first paragraph are crucial. They help make this chapter the nearest approach in words to what we know as the medieval T-O map – nearer than the corresponding descriptions in Pliny, Augustine, or Isidore. However, the development of the T-O map is generally attributed to Isidore and Isidore's forebears, and there has not been much discussion of its history that links it to Bede.[65] The earliest surviving T-O map appears to be the one that is found on the last folio (f. 24^{v}) of a seventh-century manuscript of Isidore's *De Natura Rerum*. This manuscript, Escorial, Real Biblioteca R.II.18, ff. 9^{r}–24^{v}, dated 636 X 686, is the oldest exemplar of Isidore's work.[66] However, f. 24^{v} is in a different hand from that of the earlier folios and in the judgement of Jacques Fontaine 'semble légèrement postérieur au premier'.[67] There are, in fact, two T-O diagrams, side by side, on the bottom margin of this folio. They are conveniently reproduced by G. Menéndez-Pidal.[68] The diagram on the left appears to be the original; the one on the right a later copy.[69] Both diagrams show a compass-drawn circle bisected by a horizontal line. The lower half of the circle in turn is bisected by a vertical radius. The horizontal diameter and vertical radius together comprise the 'T' which is inscribed within the 'O' of the T-O format. The word ASIA appears in the upper half circle; the word EVROPA in the lower left quadrant; and the word AFRICA in the lower right quadrant. A faint larger circle encloses the diagram on the left, but not the one on the right.

The phrase 'girded by the Ocean' corresponds to the outer circle of the left-hand T-O map. The statement, that '*Asia* is comparable in size to the other two', contradicts Pliny, who assigns this magnitude to Europe.[70] Bede could have taken the assertion, though not the wording, from Augustine or Isidore.[71] In any case, as Kendall wrote in the Introduction to Bede's *On Genesis*: 'If Bede visualized the earth as a globe with a particular orientation in space, it seems likely that he would have located the three continents known to him – Europe, Africa, and Asia – on the "top" of the globe. These would constitute "the upper part of the world," roughly in the form of a

65 But see Destombes, *Mappemondes AD 1200–1500*, pp. 35–36; Eckenrode, 'Venerable Bede as a Scientist', p. 498; Harley and Woodward, *The History of Cartography*, vol. 1, pp. 302–3; Edson, 'World Maps and Easter Tables', pp. 26–30.

66 Fontaine, *Traité*, pp. 20–22.

67 Fontaine, *Traité*, p. 21.

68 Menéndez-Pidal, 'Mozárabes y Asturianos', plate 2.

69 Menéndez-Pidal, 'Mozárabes y Asturianos', p. 168.

70 *NH* 3.1.5. Pliny's view can be traced to Herodotus, *The Histories* 4.45.

71 *DCD* 16.17. Isidore copies Augustine, *DNR* 48.3; *Etym*. 14.2.3.

circle of lands, surrounded by the world ocean. … Thus, if we imagine the Mediterranean as the vertical stroke of a capital T and the Don and the Nile as together forming the horizontal stroke, west would be at the bottom, east at the top, north on the left, and south on the right of our imaginary projection, with Europe in the lower left quadrant, Africa in the lower right, and Asia in the upper two quadrants of the circle of lands. These comprise the habitable regions of the north temperate zone – "the upper part of the world." Projected on a flat surface, Bede's description of the circle of lands in *On the Nature of Things* would correspond precisely to the schematic T-O maps of the later Middle Ages …'. See Introduction, pp. 10–12.

COMMENTARY:
ON TIMES (OT)

OT, Chapter 1: Moments and Hours

Following the model of earlier didactic treatments of time, notably Isidore's *DNR* and the Irish dialogues, Bede arranges *On Times* according to the units of time, in ascending order of magnitude. However, he carefully restricts himself to those units which are actually used in computistical calculation. He may have been criticized for this, because in chapter 3 of *The Reckoning of Time* he explains terms for even smaller units, namely *ostensa* and atoms. However, he associates these with the specious calculations of astrologers, and by implication dismisses them from *computus*. It is important to bear in mind that Bede's *minutum* is not the modern 'minute'; indeed, he never thinks of the hour as divided into 60 parts. For our purposes, though, it might be helpful to remember that a *punctus* is 15 minutes, a *minutum* 6 minutes, and a *momentum* 1½ minutes.

This chapter illustrates two of Bede's principal preoccupations concerning time. The first is the relationship between natural time – time as God created it, marked out by the movements of the heavens – and the conventions of human time.[1] Chapter 2 will provide a concrete illustration of this distinction. The second is the notion of time-reckoning as a process of setting bounds, and hence bestowing order upon the 'fleeting and wavetossed course of time' (*The Reckoning of Time* 71). The motion of the stars which is the etymological root of the term *momentum* is the 'outermost boundary' that distinguishes one instant of time from the next; the etymology of *hora* is also linked to edges and boundaries. This theme will be picked up again in chapter 3.

OT, Chapter 2: The Day

In this chapter Bede highlights the difference between the natural and universal day of 24 hours, and the conflicting meanings of the word 'day' in diverse human cultures. However, divinely created nature and particular

1 This is discussed in detail in Wallis, '*Si Naturam Quaeras*: Reframing Bede's "Science"', esp. pp. 78–90.

historic experience converge in the sacred time of God's chosen people, confirmed and fulfilled in the Gospel. Bede's claim that Moses reckoned the day from morning to morning may seem odd, given the Jewish practice of beginning the day at sundown. What he seems to have in mind is the description of the days of Creation in the opening chapter of Genesis: 'and there was evening and morning: one day (*factumque est vespere et mane dies unus*: Gen. 1:5)' – a locution he interprets to mean that the whole period from the beginning of Day One to the dawn of Day Two was the first day.[2] He then compares this to the account of the Resurrection, which takes place (as he sees it) at dawn, that is, on the cusp of the Sabbath and the first day of the week. The imagery of light is profoundly important in Bede's overall view of the symbolism of the timing of Easter (see ch. 15 below), but the association of the Resurrection with the frontier between the seventh day and the first day will only be fully expounded in the closing chapter of *The Reckoning of Time*, where Easter symbolizes the transition between the temporal world and the new creation of the world to come.[3]

OT, Chapter 3: The Night

The theme of boundaries and order enunciated in chapter 1 returns here. Night seems to be an unchartable time of formless darkness. The moon does not consistently illuminate the night as the sun does the day, so its light does not 'make' the night; monks told time at night by the stars, but these could be blotted out by clouds. Hence night-time is ordered by less determinate signs like 'the uncertain light between light and darkness' or the 'first faint light of day'. Night is defined as absence and immobility, so it is all the more interesting that Bede, following Isidore, should have set out to impose order and shape on the night in the form of precisely defined periods. Bede adds an original comment: humans, it seems, are workaholics and need to be forcibly brought to a halt by darkness, lest they perish in their obsessive exertions.

Since computists deal only in natural 24-hour days, one may wonder why Bede devoted a chapter to the night, which is not, properly speaking, a unit of time. The more elaborate treatment of this theme in *The Reckoning of Time* 7, may hold the clue. Here Bede dilates on how night is but the shadow of the earth, and its darkness a kind of local optical illusion; the heavens, in fact, are always lit up by the splendour of the sun. He pins this discussion to a quotation from Song of Songs 2:16-17: 'until the day breaks and the

2 See Bede, *On Genesis* 1.1:5b (ed. Jones, pp. 9–10; trans. Kendall, p. 75).

3 *The Reckoning of Time* 71, trans. Wallis, pp. 246–49; cf. Wallis, pp. 373–75.

shadows give way'.[4] We may infer, then, that Bede is continuing to reflect on the symbolism of Easter as the moment when temporal and earthly darkness is swept away by the true and everlasting light.

OT, Chapter 4: The Week

This chapter on the week will be considerably expanded in *The Reckoning of Time* 8, and supplemented by an additional chapter on the 'prophetic weeks' of Daniel 9:24. Moreover, the symbolism of the week underpins the interpretation of the relationship of the Six World-Ages to the Seventh and Eighth Ages which Bede will borrow from Augustine. In *On Times*, however, Bede sticks to computistical basics: he does not even mention the week of creation. On the other hand, given that the Church officially referred to the weekdays by number, a usage attributed to Pope Sylvester, it is interesting that Bede quotes Isidore's astrological explanation of the Roman planetary weekdays. In *The Reckoning of Time*, perhaps in response to his readers' puzzlement or alarm, he will qualify this by some scientific rationalizations: the moon does not really create bodies, but it controls humidity on earth and so is associated with the growth of bodies, etc. Evidently the planets and the pagan gods, Roman or Germanic, continued to provide the names for the weekdays that people used in everyday speech, and thus these names had to be addressed and explained.

OT, Chapter 5: The Month

This chapter, like the chapter on the day, contrasts the authority of God's 'natural' time with the arbitrary diversity of human time-reckoning conventions. The month is properly the lunar synodic month, that is, the period from one new moon to the next. As Bede observes, it is 'a little more than 29½ days' long: the 'little more' is a crucial qualification, which will be explained in ch. 12, 'On the Leap of the Moon'. The task of the computist is to align the phenomena of the heavens with a calendar, and calendars work only with whole days. For this reason, the 29½-day lunar month is regularized into alternating 'full' and 'hollow' months of 30 and 29 days respectively. A solar month, on the other hand, is a sidereal month: it is one-twelfth of the time required for the sun to complete a circuit of the ecliptic. Bede declares that this solar month is 22 hours longer than the lunar month, but does not explain in detail why. The reason is as follows. The sun's annual circuit requires 365 days (the ¼-day leap year increment can be ignored for present purposes). Multiplied by 24 this yields 8760 hours; when these are

4 *The Reckoning of Time* 7, trans. Wallis, p. 29.

divided by 12, the result is 730 hours per solar month. The lunar month of 29½ days is 708 hours, or 22 hours less. These 22 hours, multiplied by 12 months, total 264 hours or 11 days. These are the lunar 'epacts' – that is, the number of intercalary days needed to reconcile 12 lunar months (354 days) with the solar year (365 days). Bede's students evidently craved this explanation – and wanted to know as well what happened to the ¼-day increment: hence the more circumstantial account in *The Reckoning of Time* 11.

The Hebrews exemplify a calendar based on lunar months; the Egyptians 'demarcate the months according to the course of the sun'. Bede seems to favour the solar calendar as inherently more reliable.

OT, Chapter 6: The Months of the Romans

In *The Reckoning of Time*, chs. 11–15, Bede presents a lavish antiquarian survey of the names of the months in ancient Israel, Egypt, Macedonia and Rome, culminating in an invaluable discussion of the pagan Anglo-Saxon months. In *On Times*, he confines himself to computistical essentials, and discusses only the Roman months, the ones his students will encounter in the Church's calendar. The Roman system of dating by reverse count from the marker dates of kalends, nones and ides also required some introduction, though here again, Bede only furnishes a basic historical-etymological explanation of the terms.

OT, Chapter 7: Solstice and Equinox

The next unit up from the month is the year, but Bede mediates the leap in this and the following chapter by discussing two ways in which the circle of the year is articulated: first, by the four turning-points in the sun's trajectory around the ecliptic, namely the solstices and equinoxes; and secondly, by the earthly consequences of this turning, namely the four seasons. Given that *On Times* is a textbook based on the Alexandrian *computus*, as adapted for the West by Dionysius Exiguus, and that the Alexandrian reckoning of Easter vociferously promotes 21 March as the astronomical date of the vernal equinox, it is curious that Bede presents Isidore's obsolete Roman dates for the solstices and equinoxes (25 December, 25 March, 24 June and 24 September) without comment. He will correct himself in ch. 10 of *On Times*, and at much greater length in ch. 30 of *The Reckoning of Time.*

From a computistical perspective, the date of the vernal equinox is the only matter of significance, but it is worth pausing to consider why Bede even mentioned the old Roman dates. Comparing this chapter with *The Reckoning of Time* suggests that Bede is trying to absorb authoritative infor-

mation from Isidore, Pliny and others about how the sun's circuit affects time on earth. Unfortunately, both authors accept the old Roman dates, not the revised Alexandrian ones. Bede even quotes Pliny's statement that the equinox occurs in the 8th degree of Aries; in ch. 6 of *The Reckoning of Time* he will present a complex argument to the effect that the equinox must be in the 4th degree of Aries, because the sun was created on the fourth day of creation.[5] Each sign of the zodiac marked off, spatially, 30° of the ecliptic (360° divided by 12 = 30°) and, temporally, one notional month (365.25 days divided by 12 = 30.4375 days) of the year. The signs were related to the solar year by the rising and setting of the constellations for which they were named. Thus, taking Aries for illustration, Bede's statement means, theoretically, that 8/30 of the sign of Aries was above the horizon at sunrise on 25 March, and that the same 8/30 was below the horizon at sunset (practically speaking, it would be the only zodiacal constellation not visible at any period of the night at that time of year).

It seems doubtful that Bede and his students would have any means of directly measuring 8° of Aries; since each sign = 30° and 30+ days and therefore 1° = approximately one day, the conclusion he would expect them to draw from the statement, we think, is that on the vernal equinox Aries was in its eighth day (i.e., the sun entered Aries on 18 March).[6] (N.B., because of the precession of the equinoxes the constellations are no longer in the signs of the zodiac to which they gave their names.) At the time Bede was writing, the vernal equinox, in fact, had moved forward to 17 March.[7]

Bede closes the first part of this chapter by remarking that the equinoctial days are of the same length the whole world over, regardless of latitude. The second part of this chapter is a lengthy quotation from Pliny explaining how the solstitial days – notably those of the summer solstice – vary in length with latitude. This quotation will be considerably expanded in *The Reckoning of Time* 31. The section on the island of Britain was obviously of particular interest to Bede and his readers – indeed, it will be paraphrased in the opening chapter of Bede's *Ecclesiastical History.* It is therefore curious that he should have copied Pliny's rather confused statements about Thule's six months of continuous day followed by six months of continuous night without qualification or comment. Pliny is writing about two separate, but related, concepts – the Arctic Circle, where the day is 24 hours long on the summer solstice, and the North Pole, where the sun is above the horizon

5 Trans. Wallis, pp. 24–28; see also Wallis, p. 28, n. 48.

6 See *DTR* 16, and Wallis, *The Reckoning of Time*, Appendix 1.

7 See Jones, *BOT*, pp. 126–27.

for half the year. Bede makes the distinction between the two clearer in *The Reckoning of Time* 31, but even there it is not certain whether he had thought through all the implications of the distinction. He repeats Pliny's uncertainty as to whether the longest day on Thule was 24 hours or six months (some authorities asserting the latter). The question is, whether in Bede's mind the uncertainty had to do with Thule's latitude (could it have been as far north as the North Pole?), or with the proposition that the day might be six months long everywhere north of the Arctic Circle. Given the usual precision of Bede's thinking on astronomical topics, the former seems likely, but we cannot be sure. In *On the Nature of Things* 9, and *The Reckoning of Time* 34, he speaks of a frozen sea lying one day's sail north of Thule.

OT, Chapter 8: The Seasons

For those who dwell on earth, the principal consequence of the sun's annual journey to the northern sky and then back down to the south, other than variations of daylight, is the alternation of the seasons. The statement that the sun 'abides for a longer period of time' in winter is somewhat obscure. What Bede appears to mean is that by the calculation of 'the ancients' winter has 92 days, spring 91, summer 90 and autumn 92. Therefore winter (along with autumn) is a longer season than spring or summer. Bede alludes to this point again in *The Reckoning of Time* 30, where he quotes the pseudo-Hippocratic *Letter to Antigonus* to the effect that winter is the longest season (97 days in this case).[8] In *On Times*, Bede merely reports that the ancients held that the seasons straddled the solstices and equinoxes. He does not explicitly endorse this scheme, and evidently some of his students wanted him to declare his own views on the subject. In *The Reckoning of Time* 35, he elaborates on different proposals for dating the seasons, and even cites Anatolius of Laodicea in support of the 'straddle' model. However, he follows this with a warning that Deuteronomy 16:1 specifies that the month in which Passover is celebrated is the first month of spring. Thus Bede continues to evade the issue of when the seasons actually begin. Was he unsure on this subject? Did he think the question pointless or a matter of custom, like the beginning of the day in different cultures? Did he wish to remove *computus* from such questions, perhaps because they were redolent of pagan seasonal celebrations?

The closing paragraph of this chapter is a passage from Isidore's *Etymologies* explaining the correspondences between the seasons and the cardinal directions. Bede does not use Isidore's *DNR* 7, here, which extends the

8 Trans. Wallis, pp. 86–87.

metaphor to encompass the humours of the body and the ages of man. This is all the more interesting in that he does explore those dimensions in *The Reckoning of Time* 35. This is perhaps a good index of how *On Times* sticks close to computistical basics, while *The Reckoning of Time* takes a more encyclopaedic approach. Moreover, Bede's interest in medicine seems to have increased with time.

OT, Chapter 9: Years

As is evident by now, the chapters of *On Times* are carefully linked, and the whole treatise is structured around leitmotifs. In the first paragraph of this chapter, Bede returns to the motif of the variable calendar conventions of different human societies, and uses these to bridge the solstices and equinoxes to the discussion of the year. Like the month, the year comes in both a solar and a lunar form. The solar year is tacitly presented as stable and invariable (see the remarks on the Egyptian year above), while the lunar year is variable: either 'common' (12 months, or 354 days) or 'embolismic' (13 months, 384 days). Plainly this was far too concise for Bede's readers; *The Reckoning of Time* 45 provides a greatly expanded explanation. On the other hand, the Great Year will be swallowed up into a chapter tellingly entitled 'Natural Years' (*The Reckoning of Time* 36). Josephus's estimate is anomalously low compared to the immensely long Great Years of the ancient philosophers. Whether Bede knew of these speculations is uncertain, but he may have preferred a lower estimate because it was compatible with Biblical chronology.[9]

OT, Chapter 10: The Leap-Year Day

This chapter closes the section of *On Times* devoted to the solar calendar by discussing its most significant computational anomaly, namely the insertion of the leap-year day. Ever conscious of the parallels and patterns in his textbook, Bede will open the section on the Paschal Table which follows by examining its cognate anomaly, the 'leap of the moon'.

The explanation seems quite straightforward, but actually provides us with a useful lesson in how Bede visualized the relationship of the heavenly

9 Bede might have been acquainted with Augustine's critique (*The City of God* 12.12-14) of the ancient concept of the Great Year, particularly its allegedly cyclical character and immense length: see de Callataÿ, *Annus Platonicus*, pp. 95–96. It is very unlikely that he knew of the arguments of the Greek Fathers Clement of Alexandria and Origen, or of the discussion by Cicero, Censorinus, Macrobius, etc. Pliny's estimate of the length of the Great Year in *NH* 10.4-5 is even shorter than Josephus's: five hundred and forty years (coinciding with the life-span of the phoenix).

bodies to the calendar – his distinctive spatial imagination of time.[10] The quarter-day excess of the true solar year over its calculated length of 365 days means that the sun on the first year after the leap year will cross the ecliptic at the vernal equinox not at dawn, but a quarter-day (six hours) later. One could say that the sun has run ahead of the calendar by six hours. But Bede sees it the other way around: the sun is 'lagging behind', meaning that it is not arriving at the ecliptic 'on time'. Instead of imaging the calendar catching up to the sun by adding one day to the count of days over four years, he seems to be imaging the calendar 'marking time' for 24 hours to let the sun catch up. This may be a function of the different ways in which one inserts the leap-year day. We *add* a day at the end of February, and hence implicitly imagine the calendar advancing further; but Bede, following Roman custom, *made the calendar 'stop'* by counting the 6th kalends of March twice. Where we add a day, Bede loses one.

Though the issue of Bede's use of instrumentation to verify the true astronomical date of the vernal equinox has generated some controversy, there is no doubt that his invitation to his readers to observe the sun's 'lagging' at the vernal equinox was meant to be taken seriously. He was probably familiar with the ancient folk-surveying technique of constructing a *horologium* (actually, a compass) on the ground (see above, p. 143), because he mentions it in *The Reckoning of Time* 38 (*horologiis lineis in terra*).[11]

OT, Chapter 11: The Nineteen-year Cycle

Chapter 11 marks a watershed in *On Times*, where Bede's attention moves from one computistical reference document – the solar calendar – to another, the Paschal Table. The structural basis of the Paschal Table is the nineteen-year lunisolar cycle discussed in the Introduction, pp. 23–25. From Bede's perspective, the only interest of the nineteen-year cycle lies in its capacity to identify and predict the full moon on which the date of Easter depends. 'Predict' is the active verb here, because the date of Easter had to be known well in advance, as several months of pre-Paschal observances had to be scheduled.

Bede is imagining that his reader is actually looking at a Dionysian Paschal table, where the nineteen years are usually divided into two sections: the *ogdoas* of eight years, and the *hendecas* of eleven years. These are relics of older cycles, notably the *octoaëteris* where three embolisms are inserted

10 This is discussed in greater detail in Wallis, 'Caedmon's Created World and the Monastic Encyclopedia'.

11 *DTR*, ed. Jones, p. 401; *The Reckoning of Time*, trans. Wallis, p. 107.

over eight years, and the eleven-year cycle with four embolisms. The eight-year cycle is too long by about two days to be truly cyclic; the eleven-year cycle falls short by almost the same amount. Hence early computists conceived of the nineteen-year cycle as an eight-year cycle and an eleven-year cycle compensating for one another. They almost do – but the 'leap of the moon' is required to bring them fully into alignment at the end of nineteen years.

Bede provides a much fuller explanation in *The Reckoning of Time* 46. The final paragraph in this chapter shows why this was necessary. Some people thought that the nineteen-year cycle really was a full eight-year cycle followed by a full eleven-year cycle, and that the two-day shortfall in the eight-year cycle would be supplied by the two leap-year days accumulated over the eight years. In *The Reckoning of Time* 41, Bede explains that leap-year day is only a 'non-day' within the artificial framework of the calendar. In the real world, the bissextile day is a real day, and so it counts as a day for both the sun and the moon. It therefore cannot be used to bring the moon into alignment with the sun. The ogdoad and hendecad are not self-contained cycles, but complementary parts of a single nineteen-year cycle.

OT, Chapter 12: The 'Leap of the Moon'

For modern English speakers, the 'leap of the moon' (*saltus lunae*) might sound like the lunar equivalent of leap-year day. In fact, it is the inversion of the leap-year day phenomenon. As Bede puts it, while the sun 'lags' with respect to the calendar, the moon 'advances'. From one year to the next, the same phase of the moon in the same lunar month will appear a little earlier: Bede calculates the advance at one hour, 10½ *momenta* (15¾ modern minutes), plus 1/19 of one-half of a *momentum.* In *The Reckoning of Time* 42, he will substitute *puncti* for *momenta*, perhaps for greater ease of calculation. The advance there is expressed as one hour, one *punctus* (15 minutes) and 1/19 of a *punctus*. Either formula, when multiplied by 19, produces exactly one 24-hour day. Thus the moon is (in theory) one day older than its calculated age at the end of the 19-year cycle. The lunar count is adjusted to reality by 'leaping over' a day: the epact or age of the moon on 22 March in the year 1 of the cycle should be 29, but it is counted as 30, i.e., a new moon, the equivalent of zero.

Bede obviously based his calculation of the *saltus* increment on the theoretical proposition that the lunar cycle was retarded by exactly one day in nineteen years rather than on any precise observation of the actual retardation. Indeed, had he checked the theory with physical observations, he

would have realized that something was not quite right. In *The Reckoning of Time* 43, he more or less admits this, trying to rationalize why the calculated moon and the visible moon do not always agree. The *saltus* increment for the nineteen-year cycle is in fact in error by about 1½ hours; in Bede's day, the slippage was noticeable – about 1½ days. It was precisely this slippage that resulted in the mis-dating of the eclipse of May 664 (see note 308 on chapter 22).

_OT_, Chapter 13: The Contents of the Paschal Cycle

Chapter 13 is a commentary on the Paschal Table itself. The Dionysian table was arranged in eight columns, each with a heading or *titulus*. Dionysius furnished formulas (*argumenta*) for obtaining the data recorded under each *titulus*. These *argumenta titulorum* are laid out in ch. 14. In *The Reckoning of Time*, Bede will greatly extend this material, furnishing a chapter for each *titulus* of the table, following it with a chapter explaining the *argumentum.*

The Table lists from left to right the years of the Incarnation, the indictions, lunar epacts, solar concurrents, year of the lunar cycle, date of the 14th moon of the Paschal month, the date of Easter, and the age of the moon on Easter Sunday. Curiously, Bede does not dilate on the religious or historical significance of *annus domini* reckoning: indeed in *The Reckoning of Time* 46, he will reveal his scepticism about the historical foundation of Dionysius's chronology. *On Times* sticks to what is computistically significant about the era, namely, that is open-ended or prospective. As Bede says, the number of the years increases by one with each passing year. This means that one year can be distinguished from the next by a *number* (as distinct from, say, a consular or regnal name), and a number which can be *projected indefinitely* into the future (unlike a regnal year, which can only refer to the present and the past, or the indictions, which are cyclical). While the years of the Incarnation are universal, the indictions are 'Roman' – a purely secular numbering of years, which does not participate in the cyclical character of the table as a whole.

The third column lists the lunar epacts. This number represents the age of the moon on 22 March. That age will increase by 11 days each year, until the total tops 30 and an embolismic month is inserted. As Bede points out, one adds the annual lunar epact to the lunar 'regular' of any month to find the age of the moon on the first day of that month in years two through nineteen of the nineteen-year cycle. The lunar regular is a number assigned to each month of the calendar, which represents the age of the moon on the

first day of that month in year one of the nineteen-year cycle.[12] The fourth column contains the solar epacts or concurrents, a number standing for the weekday of 24 March. Rather cryptically, Bede states that 'because of the loss [occasioned by] the leap-year day, they are of necessity completed in twenty-eight years'. Because the solar year is 52 weeks plus one day long, this cycle would repeat every seven years were it not for the 'loss' of the leap-year day. In normal years there is one day left over after 52 weeks (52 X 7 = 364 + 1 = 365), so the concurrent on 24 March will advance by one in successive years (if 24 March is Monday this year, then it will be Tuesday next year). But if the next year is a leap year the concurrent must advance by two (52 X 7 = 364 + 2 = 366) (if 24 March is Monday this year, then it will be Wednesday next year). It requires 28 years (7 weekdays times the four years of the leap-year cycle) to work though the sequence of concurrents, e.g. 1,2,3,4 (leap-year), 6,7,1,2 (leap-year), 4,5,6,7 (leap-year), and so forth. The reason for the choice of 24 March for the concurrent is not certain.[13] Finally, Bede observes that a full Paschal cycle would have to work through this twenty-eight-year cycle 19 times. That is because while the lunar terminus of Easter – the fourteenth day of the moon of the Paschal month – recurs on the same date every nineteen years, that date will fall on a different weekday each year, and hence the date of the following Sunday, Easter day, will vary. All the data in the Paschal table (apart from the *annus domini* and the computistically irrelevant indictions) will repeat in exactly the same sequence over five hundred and thirty-two years.

The fifth column is the lunar cycle. This is an old Roman variation on the nineteen-year cycle, which begins with a year in which 1 January, rather than 22 March, is a new moon. Lunar cycle year 1 corresponds to Dionysian cycle year 4. That is why Bede says the Dionysian cycle 'precedes' it by three years. The sixth column contains the calendar date of the 14th or full moon of the Paschal month, which is the lunar terminus for Easter. These recur on the same day every nineteen years. Easter, however (column seven), does not recur on the same date every nineteen years, because Easter must fall on a Sunday, and the weekday of the 14th moon will shift according to the cycle of the concurrents. In consequence, the age of the moon on Easter Day (column eight) will also vary.

12 See Jones, *BOT*, p. 356, and Wallis, *The Reckoning of Time*, p. 65. In Jones's table, the lunar regulars are the figures for year "i" (the first horizontal row).

13 For a likely explanation, see Jones, *BOT*, pp. 387–88, and Wallis, *The Reckoning of Time*, p. 342.

_OT,_ Chapter 14: The Formulas for the Headings of the Paschal Tables

Dionysius Exiguus initially presented his Romanized version of the Alexandrian Paschal Table as a critique of the clumsy attempt by Victorius of Aquitaine to construct a table based on the nineteen-year lunisolar cycle, but expressed in Roman calendar dates. Victorius's table enjoyed some unmerited prestige because it was commissioned by archdeacon Hilarius, later Pope Hilarius. Dionysius was a foreigner in Rome and enjoyed no such patronage, so he sent his tables, accompanied by a translation of formulas (*argumenta*) for calculating and verifying the data in each column used in Alexandria, to the otherwise obscure bishop Petronius.[14] The *argumenta* were later expanded, particularly with a view to using them as a teaching aid: additional versions of the same formula were created, and the 'present year' was sometimes (though not always) updated to the time of writing. Bede modified Dionysius's formulas in exactly this way, though he resisted the temptation to include formulas not pertinent to the eight columns of the Paschal table. The point of the formulas is not only to instruct the reader as to how the data in the table were generated, but to allow him to check the table for accuracy. Then as now, it is difficult to copy rows of figures accurately.

Bede only departs from Dionysius's text at the very end of the chapter, where he presents a rather different formula for finding epacts and concurrents for any year in the future. In ch. 55 of *The Reckoning of Time*, Bede presents still other formulas for ascertaining Paschal table data for the distant future. This stress on the *future*, indeed, the *remote* future, is particular to Bede, and rather curious. What practical purpose could be served by calculating the concurrent for one hundred years from now? One motive might be to reinforce the idea that the world was not about to end, or at least that as far as human knowledge can ascertain, it is just as likely that the world will continue a century from now as not. Only God knows when the age will come to a close. As our Introduction explains, Bede may have composed *On Times* with a view to deflating apocalyptic speculation.[15] This novel formula may be an oblique reference to his determination on this point.

_OT_, Chapter 15. The Sacrament of the Easter Season

Chapter 15 is presented almost as if it were the summary of an argument – and indeed it is. The fact that Easter is a *movable* feast indicates that

14 Wallis, *The Reckoning of Time*, pp. liii–liv; Dionysius's text is edited by Krusch, 2, 75–81.

15 See above, pp. 29–30.

it is more than an anniversary; it embodies *transition* from death to life, and since it is what it symbolizes, it is truly a sacrament.[16] The criteria for determining the date of Easter are three, relating respectively to the year, the month and the week. Easter takes place after the vernal equinox, because after the equinox, the days are longer than the nights, symbolizing the triumph of the true Light of the world. The equinox is the *terminus a quo* (as medieval Christians understood it) of the full moon of the ancient Hebrew 'first month' of Nisan, the 'month of new grain' when new life came to the human race. Easter was celebrated in the third week of that lunar month, from the 15th to the 21st day of the moon, depending on when Sunday fell. This, says Bede, refers to the third era of grace, following the epochs before and under the Law.

This period of the full moon of spring symbolizes 'the creation of glorious light'. The phrase as it stands is somewhat cryptic, but Bede's elaborations on this theme in *The Reckoning of Time* provide two possible lines of interpretation. The Sunday of Easter represents the Eighth Age of the world, which inaugurates a new creation (*The Reckoning of Time* 71). Sunday is the first day of the week, the anniversary of the first day of creation, when God fashioned the first of his creatures, light (the sun was only created on the fourth day). Secondly, at the full moon of the vernal equinox the world is continuously illuminated for 24 hours – a fact which Bede explicitly connects to the mystery of the resurrection in *The Reckoning of Time* 64.

***OT*, Chapter 16: The Ages of the World – Chapter 22: The Sixth Age**

The chronicle of the Six Ages which occupies the remainder of *On Times* is a good illustration of Bede's working habits, at least when he was a young scholar, engaged in composing didactic treatises. It has been remarked that Bede laid the foundation course of a treatise by selecting a suitable base document, onto which he would add nuances, qualifications, alterations and additions – some culled from other authors, others supplied by his own reflection.[17] In the case of the world-chronicle in *On Times*, the foundation is Isidore's *Chronica maiora*,[18] together with the world-chronicle in *Etymolo-*

16 For Bede's innovative understanding of 'sign' and its relationship to terms like 'sacrament' and 'allegory' or 'symbol', see Kendall, 'The Responsibility of *Auctoritas*', pp. 106–16.

17 Holtz, "Bède et la tradition grammaticale latine," pp. 9–18. Holtz focuses on Bede's grammatical and rhetorical output, but the foundation text phenomenon is also visible in Bede's earliest Biblical commentary on the Apocalypse, which uses Primasius (without naming him) in this way.

18 Mommsen's excellent edition of Isidore's *Chronica maiora* has been superseded in some respects by the recent edition of José Carlos Martin (CCSL 112), which includes a

gies 5.38-39, known as *Chronicon* B. Indeed, with some minor exceptions these are almost the only sources Bede used. He seems to have used both, but showed no consistent preference for either. In our notes on the translation, we have adopted the policy of citing the *Etymologies* chronicle first where the information is found in both sources. However, this should not be construed to mean that we believe that Bede did, in fact, prefer the *Etymologies* chronicle.

While he revised its Old Testament chronology quite radically, and dropped references to the history of Spain (substituting a few discreet references to the arrival and conversion of the English), Bede was faithful to Isidore's and Eusebius's criteria for worthy matter. This included kings and rulers; cultural figures (at least in classical Antiquity); prophets and (later) important leaders of the Church; persecutions and heresies. The paratactic list-like style of the chronicle invited interpolation and excision; as our notes to the translation indicate, there are elements of the text which are represented in only some manuscript witnesses. When he produced his revised chronicle in ch. 66 of *The Reckoning of Time*, Bede would not only greatly expand his range of additional sources, but also adopt a stronger interpretive stance. For example, he would not only exploit the papal biographies in the *Liber pontificum*, but implicitly present the popes as the true rulers of Rome, particularly after the end of direct imperial rule in the West. He would also elaborate the terse final sentence of the Chronicle – 'The rest of the sixth age is known to God alone' – into a trenchant critique of apocalyptic speculation, both in the closing chapters of *The Reckoning of Time* and in the *Letter to Plegwin.* But it is also a reflection of Bede's fundamental posture towards historical time, for even the *Ecclesiastical History* ends on a note of tentative agnosticism: 'a future age shall see' (*posterior aetas videbit*) what the final outcome and the ultimate meaning of the story of the English Church and people will be.[19]

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thorough study of the manuscript tradition. However, our translation is based on Mommsen's text of Bede's chronicle, reproduced by Jones, which in turn cites Mommsen's texts of both of Isidore's Chronicles. To minimize confusion, therefore, we have utilized Mommsen's edition of Isidore's *Chronica maiora* as well as his edition of Isidore's *Chronicon epitome*.

19 *EH* 5.23; see the perceptive remarks of Markus, 'Bede and the Tradition of Ecclesiastical Historiography', p. 388.

APPENDIX 1

BEDE
A HYMN ON THE WORK OF THE FIRST SIX DAYS AND THE SIX AGES OF THE WORLD[1]

1 In the beginning God created the sphere of heaven
And the huge mass of earth.
But the deep abyss had covered the earth,
Which was hidden by darkness.[2]

2 But over the days that correspond
To the Ages of fleeting time[3]
He ornamented the globe and the sky
And the whole fabric of the world.

3 On the first day the Creator of the world,
Scattering the darkness,
Illumined with light the globe
Which was still hidden by waters.[4]

4 Presently, in the First Age
The most high[5] Creator of the world
Filled the inhabitants of the earth

1 Our translation is based on the edition printed by Fidel Rädle in his 'Bedas Hymnus über das Sechstagewerk und die Weltalter', pp. 59–62, which is to be preferred to that edited by J. Fraipont, in *Bedae Liber Hymnorum* (CCSL 122, 407–10). Rädle's article includes an introduction (pp. 53–58), German translation (pp. 64–65), and commentary on sources, etc. (pp. 66–73).

2 Gen. 1:1-2b.

3 Bede echoes his own phrase *labentis aeui* from the verse epigraph that he prefaced to *On the Nature of Things*, where he wrote of the broad ages 'of fleeting time' (*labentis et aeui*). See above, p. 71.

4 Gen. 1:3, and cf. Bede's commentary, *On Genesis*, trans. Kendall, p. 73.

5 Typical Bedan wordplay. The most high (*altissimus*) Creator bringing light is at the opposite pole from the deep (*alta*) abyss (stanza 1) which covers the earth in darkness.

With the joys of blessed light.[6]

5 On the second day the vast sphere of heaven
Is placed in the midst of the waters
And the labile liquid
Is divided on both sides.[7]

6 In the very beginning
Of the Second Age the mystical Ark
Is placed in the midst of the waters
Running together from one side and the other.[8]

7 At the dawning of the world's third day
The deep abyss flowing
Under the sky subsides,
And dry land appears growing green.[9]

8 The offspring of Abraham, chosen
From the billowing waves of the faithless,
Grew bright, flowering
At the dawning of the world's Third Age.[10]

6 Cf. Bede's excursuses on the Ages of the World: *On Times* 16 (above, pp. 117–18); *On Genesis* 1.2:3a/b, trans. Kendall, pp. 100–5; *The Reckoning of Time* 10 and 66, trans. Wallis, pp. 39–41, 157–59. The 'joys of blessed light' that 'filled the inhabitants of earth' can be more fully understood as 'the light of divine knowledge' which diminished in humankind as the evening of the First Age approached (*On Genesis* 1.2:3a/b, trans. Kendall, p. 101). Bede reckoned the First Age from Adam to Noah; the Second from Noah to Abraham; the Third from Abraham to David; the Fourth from David to the Babylonian exile; the Fifth from the Babylonian exile to the nativity of Christ; and the Sixth from the nativity of Christ to the day of Judgement (including the present).

7 Gen. 1:6-8. Bede interprets these verses of Genesis to mean that there are waters above the starry heavens as well as below on earth (*On Genesis* 1.16-8, trans. Kendall, pp. 75–77).

8 Noah's ark is 'mystical', because it has not only a literal, historical reality, but also multiple allegorical meanings. Bede explains that the ark 'was placed in the midst of the waters, which all the ruptured fountains of the deep eagerly poured out *on the one side* and the opened flood gates of heaven poured out *on the other*' (*On Genesis* 1.2:3a/b, trans. Kendall, pp. 101–2; cf. *The Reckoning of Time* 10, trans. Wallis, p. 40). This explanation seems to be the basis for Bede's wording in stanza 5, which is otherwise scarcely intelligible. Hence, the Hymn must have been composed sometime after *On Genesis*, and probably after *The Reckoning of Time* (see n. 14 below).

9 Gen. 1:9; 1:11.

10 This stanza follows closely Bede's language and imagery in *On Genesis* 1.2:3a/b, trans. Kendall, p. 102, and *The Reckoning of Time* 10, trans. Wallis, p. 40.

9 On the fourth day the light
Of the sublime lamps of heaven gleamed forth
To give the shining grace of light
To earth and sky.[11]

10 The renowned Hebrew people
In the reign of King David gleamed,
Spreading the light of their sublime deeds
In the Fourth Age.[12]

11 There is brought forth on the fifth day
A new race of swimming creatures,
Begotten from the limpid waters, and
Of flying creatures under the sky.[13]

12 In the Fifth Age in Chaldea,[14]
After the punishment of Judea,
There is brought forth from the infidels,
A new race of the faithful.[15]

13 On the sixth day was created
Man, who, displaying
The image of his Creator,
Would live blessed forever.[16]

14 The most high Creator of all,
By whom Man was created,
In the Sixth Age was created
A man, the Son of God.[17]

11 Gen. 1:14-15.

12 Cf. *On Genesis* 1.2:3a/b, trans. Kendall, pp. 102–3; *The Reckoning of Time* 10, trans. Wallis, p. 40.

13 Gen. 1:20.

14 'In the Fifth Age the people of Israel multiplied in Chaldea', *The Reckoning of Time* 10, trans. Wallis, p. 40. Bede does not mention Chaldea in the corresponding passage in *On Genesis*, which suggests that the *Hymn of the Six Ages* may be later than *The Reckoning of Time*, ca. 725.

15 The reference is to the return to Israel of some of the children of the Babylonian exile (*On Genesis* 1.2:3a/b, trans. Kendall, p. 103).

16 Gen. 1:26-27.

17 Cf. *On Genesis* 1.2:3a/b, trans. Kendall, p. 104.

15 As he sleeps, the splendid
Wife of Adam is formed,
Obtaining bone from his bones,
Flesh from his flesh.[18]

16 Now a splendid bride is born
To Christ from his very flesh
And by the mystery of his blood
As he sleeps on the cross.[19]

17 After these lofty deeds the Creator,
Resting on the seventh day,
Ordered it henceforth to be called
And to be the Sabbath.[20]

18 The Seventh Age of rest
Will be after this world,
When the Creator observes the Sabbath
After these lofty deeds.[21]

19 The Eighth Age remains,
More sublime than the rest,
When the dead will arise
From their former heap of earth.

20 And the just will see for eternity
The lovely face of Christ,
And they will be like the shining
Angels in the heavenly ark.[22]

21 He himself going before
Showed us this path to himself,
God and the Son of God,
Born from the Virgin Mother.

22 For, destroying death by death,
He conquered on the sixth day of the week,

18 Gen. 2:21-23.
19 Christ's bride is the Church. Cf. *On Genesis* 1.2:3a/b, trans. Kendall, p. 104.
20 Gen. 2:2-3.
21 Cf. *On Genesis* 1.2:3a/b, trans. Kendall, pp. 104–5.
22 Cf. *On Genesis* 1.2:3a/b, trans. Kendall, p. 105.

But he rested on the Sabbath
Hidden in the heart of the earth.

23 And on the first day of the week,
By arising, he opened the gate of life,
And with his fellow rejoicers
He ascended to the throne of the Father.

24 And in the Six Ages
Of this world he orders that we,
By bearing now our cross,
Conquer the whole law of death.

25 Freed from the bonds of the flesh,
We shall enter the Sabbath of eternal life
After all the battles of the world
Have ended in victory.

26 The first day of the week will follow
To be concluded with no ending,
When the eternal immortality
Of the flesh is returned to us.

27 Thus having obtained the twofold joy
Of flesh and spirit,
We shall ascend to the heavenly walls
Of the eternal kingdom.

28 Allow us to come thither,
We pray, holy Trinity,
And to know Thee, the one
True God, forever.

Commentary

The 'book of hymns in various metres and rhythms' that Bede tells us he composed (*EH* 5.24, trans. Colgrave, p. 571) has not come down to us intact, but eleven hymns that are certainly his survive.[23] As Michael Lapidge has noted, 'With one curious exception, all the hymns by Bede pertain to feasts of the liturgical year, not to the daily Office'.[24] The 'curious exception' is

23 Hymns numbered 1–3 and 6–13 in Fraipont's edition (CCSL 122, 407–15, 419–38).

24 Lapidge, 'Bede the Poet', pp. 936–37.

our poem, Bede's hymn on the six days of creation and the six ages of the world. Bede may have seen this as a way of linking his grand vision of God's universal calendar with his love of the Church's celebration of the fixed and moveable feasts of the calendar year for which his other hymns were designed. It is the poetical counterpart of his chapters on the Six Ages in *On Times*, *The Reckoning of Time*, and *On Genesis* (see above, n. 6), and a splendid manifestation of his lifelong passion for poetry, cosmology, chronology, history, allegorical exegesis and prayer.

Like all the other genuine hymns by Bede, it is composed in classical iambic dimeters, that is, in quantitative octosyllabic iambic lines. As Bede points out in *The Art of Poetry* 21, this was the metre that Ambrose employed in all his hymns. The metrical schema is:

X — | ˘ — | X — | ˘ X |.[25]

The hymn is constructed with Bede's customary skill. From stanza 3 to stanza 18, successive pairs of stanzas are linked by the repetition of the first line of the prior stanza as the fourth line of the succeeding stanza (i.e., 3.1 = 4.4; 5.1 = 6.4; 7.1 = 8.4; etc.) (Bede employed this device again in his Hymn on the Holy Innocents). These repetitions link each of the first seven days of creation to the corresponding Ages of the World. There are two pairs of stanzas for the sixth day and Age: in the first (13–14) the creation of Adam is linked with the appearance of God as man; in the second (15–16) the creation of Eve is linked with the formation of the Bride of Christ, the Church, on the cross. The Hymn ends with a prayer to the Trinity.[26]

25 Accent and ictus coincide in the third foot, except when the line ends with a disyllabic word. Bede employs elision (2.3, 5.3, 9.2, 12.1, 16.3, 17.3, 18.2, 20.4) and generally avoids hiatus (except 15.4).

26 George H. Brown points out that this follows 'the common practice of concluding a hymn with a doxology' (*A Companion to Bede*, p. 89).

APPENDIX 2

AN EXCURSUS ON BEDE'S MATHEMATICAL REASONING

In an attempt to understand Bede's approach to an arithmetical problem and its solution, we offer for those who may be interested a hypothetical reconstruction of his process of thought in *On the Nature of Things* 21. How did Bede construct his formula or 'method for determining the course of the moon through the signs of the zodiac'? We begin by assuming that he knew that one way to find the correct answer to the problem he set is that given by the second alternative in our commentary (above, p. 151). We further assume that he worked out the correct answer for himself (5 11/41 signs or 5 signs and 14 2/3 hours).

FIRST APPROXIMATION

The fraction of a sign that the moon advances in one day, expressed in hours, is 24 hours divided by 54 hours and *bes* (8/12 [2/3] of an hour, or 40 minutes). Bede simplifies by dropping the awkward fraction of an hour. Twenty-four divided by 54 is equivalent to 4 divided by 9.[1] Multiplying 4/9 by 12 gives the answer 5 with a remainder of 3 (or as we would say, in modern notation, 5 3/9). That remainder of 3 (or 3/9) can be expressed in hours, if we remember that the divisor 9 represents the sixth part of 54 hours (1/9 of 54 hours = 6 hours). Thus, the remainder of 3 = 3 X 6 = 18 hours. If the moon's advance through one sign took exactly 54 hours, it would advance in 12 days through 5 signs and 18 hours. This is a fairly good approximation of the true answer, but Bede brings the approximation even closer.

1 Bede, of course, was working with Roman numerals. His method of calculating fractions was necessarily different from the one we use with Arabic numerals. We do not attempt to recreate his method.

TRUE ANSWER (UNSTATED)

The fact that Bede gives the approximate answer in signs *and* hours indicates that he appreciated the equivalence of signs and hours (in his first approximation, one sign = 54 hours; 1/3 sign = 18 hours). Crucially, he must have recognized that 5 1/3 of these approximated signs = 288 hours (5 1/3 X 54 = 288), though he leaves this fact unstated. Two hundred and eighty-eight is, of course, the number of hours in 12 days. Whatever the true answer to the original problem, that answer multiplied by 54 2/3 hours must also equal 288 hours.

In his first approximation, Bede states that 1/3 sign equals 18 hours. This implies, though again he does not say so, that the remaining 5 signs of the first approximation equal 288 minus 18, or 270 hours (and, of course, 5 X 54 = 270). But five 54 2/3-hour signs = 273 1/3 hours, not 270. This is five *besses* or 3 1/3 hours too much! But never mind. Keep the five signs (= 273 1/3 hours). Instead, subtract the extra five *besses* or 3 1/3 hours from the remainder of 18 hours. 18 minus 3 1/3 hours = 14 2/3 hours. The true answer to the original problem must be, therefore, 5 signs (= 273 1/3 hours) plus 14 2/3 hours (since 273 1/3 + 14 2/3 = 288 hours).

SECOND APPROXIMATION

Bede does not give the true answer to the original problem. He begins with his first approximation (5 signs and 18 hours). He improves on this by subtracting three of the extra five *besses*, because they can be expressed as a whole number of hours (3 X 2/3 = 2 hours). Thus, his second, and final, approximation is 5 signs and 16 hours — an excess of two *besses*, or 1 1/3 hours (an amount that could surely not be detected visually).

The method Bede proposes for deriving the second approximation can only have been formulated from his knowledge of the correct solution and some means of reaching it. He may have taken satisfaction in pointing out orally to his pupils that complete accuracy could be obtained by subtracting another one *bes* for the each of the remaining 2 signs (8/12 + 8/12 = 1 1/3). The point is that his formula allows a workable approximation to be made with relative ease of what would otherwise be (for most of his readers) a difficult calculation.

APPENDIX 3

BEDE'S CALCULATION OF TIDAL PERIODS AND THE PURPORTED 'IMMATURITY' OF *ON THE NATURE OF THINGS*

Charles W. Jones asserted that '[*On the Nature of Things*] seems somewhat more immature' than *On Times*, because 'Bede could [not] have taught for many years before rejecting [Pliny's] eight-year cycle'.[1] It is certainly true that in *The Reckoning of Time* Bede chooses not to repeat Pliny's figures and opts instead for the somewhat vague statement that '[n]atural reason convinces us that the tides flow according to the pattern of the moon's cycle of nineteen years'.[2] The implication of Jones's remark is that *On the Nature of Things* must be earlier than *On Times*, which we know was composed in 703, because in the latter work he describes the nineteen-year lunisolar cycle at length, but never mentions it in *On the Nature of Things*, instead referring to a supposed eight-year lunisolar cycle of Pliny's.

Several observations are in order. First, Pliny is not advancing a lunisolar cycle of eight years, but rather a tidal cycle of a hundred lunar months, or eight years and 28 days (based on a lunar month of 29½ days). He does not give a figure for tidal advance. Rather confusingly, he states that '[b]etween two risings of the moon there are two high and two low tides every 24 hours'.[3] It is not clear whether his cycle of 100 lunar months was meant to be a cycle of high tides *per se* or a cycle of maximum high tides (spring tides or *malinae*), and perhaps he was not clear about this himself, but was merely repeating what he found in his sources. Second, his words (*centesimo lunae … ambitu*) are susceptible of some latitude of interpretation. Does 'at' the hundredth circuit of the moon mean exactly 8 years and 28 days, or does it mean 'during' or 'after the completion of' the hundredth circuit? Third, unfortunately, we have no way of knowing

1 *DNR*, ed. Jones, CCSL 123A, 174.
2 *The Reckoning of Time* 29, trans. Wallis, p. 85.
3 Pliny, *NH* 2.99.212, trans. Rackham, p. 343.

whether (a) Bede's text of Pliny read *certissimo* for *centesimo*, or (b) Bede deliberately altered Pliny's *centesimo* to *certissimo*, or (c) Bede's *centesimo* was miscopied by a scribe.

Bede was certainly capable of using the figure of 47½ minutes to calculate a tidal cycle. A tidal advance of 47½ minutes implies a period of 24 hours and 47½ minutes between high tides on successive days. The problem may be expressed as follows. From the start of a tidal period of 24 hours and 47½ minutes at a given time, say 12 noon, how many periods of 24 hours must elapse before a tidal period will again begin at noon? The answer can be obtained by expressing the length of the tidal period over the length of the day as a fraction. The numerator will give the number of 24-hour periods in the cycle and the denominator the number of tidal periods in the same cycle. Thus, 24 and 19/24 hours set over 24 hours equals the fraction 595/576. After 595 days there will have been 576 tidal periods. 595 days is far short of Pliny's eight plus years, but, perhaps realizing that after five 595-day cycles the diurnal tidal period would again coincide with the original hour of the day, Bede may have calculated that in those eight years and 53 days the moon would have completed 100 circuits and been 25 days into the 101st, loosely, 'at the 100th circuit' or more cautiously, 'at a very precise revolution'. This might be enough to explain why Bede chose to repeat Pliny's statement.

Bede took his figure for the daily tidal advance ('3/4 and 1/24 of an hour' = 47½ minutes) from Pliny's figure for the delay in moonrise for the waxing moon. In *The Reckoning of Time*, chs. 17 and 29, he employed the less cumbersome expression 'four *puncti*' (= 48 minutes). Whether this was a meaningful change intended to improve the accuracy of the figure for the daily tidal advance may be doubted. Bede would have had no means of making precise observations capable of distinguishing a difference of thirty seconds per day. He might have derived it from someone's empirical observation that there are roughly 30 diurnal tides every 31 days, which is to say, 1 diurnal tide every 1 and 1/30 days (31 ÷ 30), or 24 hours and 48 minutes. And yet, in *The Reckoning of Time* 29, Bede observes that there are 57 diurnal (114 semidiurnal) tides in 59 days. Ironically, this is so nearly correct that, had he carried out the calculation, he would have arrived at a tidal advance (in modern terms) of 50 minutes, 31½ seconds, almost precisely the modern figure of 50 minutes, 28 1/3 seconds. Did he do so but regard four *puncti* as a reasonable approximation of what would have been an exceedingly awkward fraction (5/6 + 10/19 hours) to express? We have no way of knowing. In any case, he may have realized that even a

tiny change in tidal advance would have a profound effect on any attempt to construct a 'tidal cycle'. In *The Reckoning of Time* he quietly dropped the idea of constructing one.

The tidal period is not directly related to the nineteen-year lunar-solar cycle, since the period is measured by the interval between successive moments that a given spot on earth is directly aligned with the moon (a function of the earth's 24-hour revolution on its axis combined with the moon's 27-1/3 day zodiacal circuit of the earth). Bede may have realized that his was a periodic tidal cycle (in *On the Nature of Things*), not a cycle of peak high tides (*malinae*). The *malinae* and *ledones* are generated by the impact of the 24-hour solar tidal cycle on the 24-hour and 50-minute lunar tidal period. To construct a cycle of peak high tides would have required factoring in the nineteen-year lunisolar cycle, which he did not do. But there is nothing particularly 'immature' about Bede's reasoning. The worst that can be said is that he was 'premature' in accepting Pliny's tidal cycle. There is no reason to suppose that he was not conversant with the nineteen-year lunisolar cycle in *On the Nature of Things* — he simply had no reason to invoke it. What is important is that, out of the confusing welter of information and misinformation he inherited from his sources, he extracted the key fact that the earth's tides advance and retreat in lockstep with the revolution of the moon, and that this explains the delay in successive diurnal high tides — a delay which he was able to express in a quite accurate measure of time. This was the solid foundation on which he built his highly original and justly admired chapter on 'The Harmony of the Moon and the Sea' in *The Reckoning of Time.*

APPENDIX 4

BEDE AND LUCRETIUS

The student of classical literature will be curious to know what relationship exists between Bede's *On the Nature of Things* and the Roman poet Lucretius's great poem of the same name, *De Rerum Natura*. Did Bede know the poem, and if so, what use did he make of it? The short answers are, he did not, and none. Bede took his title and most of his awareness of the *de natura rerum* genre from Isidore, not Lucretius.

Unlike Visigothic Spain, where Lucretius's poem was still known,[1] there is no evidence that it was available anywhere in Bede's time in England. The only references to Lucretius in any of Bede's works are to be found, not in *On the Nature of Things*, but in his treatises, *On Orthography* (*De orthographia*) and *The Art of Poetry* (*De arte metrica*), where he mentions him by name three times, twice with a brief quotation.[2] In *On Orthography*, under the lemma 'camara', Bede remarks:

> *Camara* ['vault', 'boat'] is spelled with an *a*, as Verrius Flaccus affirms, not *camera* with an *e*. But since Lucretius writes, *cameris ex teretibus* ['from polished vaults'], he shows that it can also be spelled *camera*.[3]

Bede took this passage verbatim from the *Ars grammatica* of Charisius.[4] The quotation from Lucretius, as it appeared in the manuscript of Charisius that Bede copied from, is manifestly not part of a hexameter line, and there is no reason to suppose that Bede thought that it came from a poem. In *The Art of Poetry*, in a chapter on the prosodic differences between 'ancient' and 'modern' poets, Bede observes:

1 Both Isidore and King Sisebut drew upon it in the seventh century: cf. the apparatus to *DNR* and Sisebut's poem in Fontaine, *Traité*, and Riché, *Education and Culture*, p. 259.

2 Jones cites Lucretius four times in the Index Auctorum to the sources of Bede's educational and scientific texts in CCSL 123C, 779. Three of these references are vague verbal parallels that can be discounted. The fourth is the reference in *De orthographia*.

3 Ed. Jones, CCSL 123A, 15.191-93.

4 Ed. Keil, *Grammatici Latini* 1, 58.23-25.

> [the ancient poets] claim that a short vowel followed by QU and any vowel whatever was common, as Lucretius did in [*DRN* 6.868]: *Quae calidum faciunt aquae tactum atque uaporem* ['which give a warm feel and steam to the water'].[5]

In this case, Bede's source for his claim about the prosodic force of QU in the classical period was the *Excerpta* of Audax, who quoted the line from Lucretius just as Bede gives it.[6] Finally, also in *The Art of Poetry*, Bede distinguishes three genres of poetry, one of which, the 'narrative or expository' he finds in the *Georgics* of Vergil, 'and also in the poems of Lucretius, and in other works similar to these'.[7] Here, Bede is quoting from the *Ars grammatica* of Diomedes.[8] Diomedes goes on to say, in a passage that Bede doesn't quote but very likely saw, that the expository genre in turn is subdivided into three types, among them, the didactic poem, which is the vehicle, *inter alia*, for 'the philosophy of Empedocles and Lucretius'.[9]

In sum, there is no evidence that Bede knew anything about Lucretius except that he was a poet (and, possibly, a philosopher), not even that his poem was entitled *De rerum natura*. He was probably unaware of the atomistic theory expounded by Lucretius and his master, Epicurus, and certainly would have rejected the atheistic and hedonistic conclusions attributed to them by classical and patristic authors like Cicero and Lactantius.

5 *The Art of Poetry* 16, trans. Kendall, p. 141.

6 Ed. Keil, *Grammatici Latini* 7, 328.18–329.3. In point of fact, Lucretius wrote *laticis* where Audax and Bede have *aquae*, though elsewhere he does employ the licence Bede describes.

7 *The Art of Poetry* 25, trans. Kendall, p. 165.

8 Ed. Keil, *Grammatici Latini* 1, 482.20-23.

9 Ed. Keil, *Grammatici Latini* 1, 483.2.

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